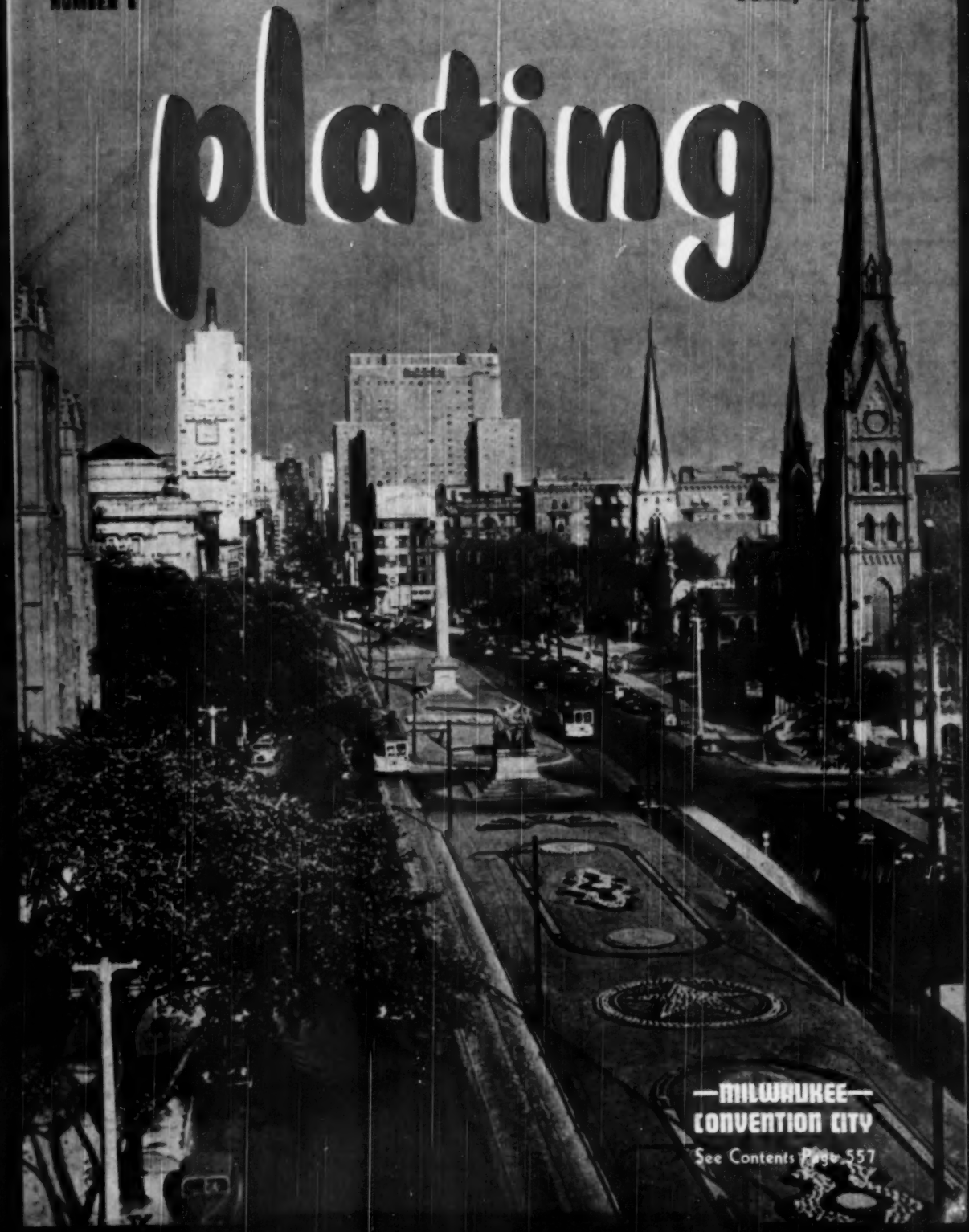
VOLUME 28
NUMBER 6

JUNE, 1940

plating



—MILWAUKEE—
CONVENTION CITY

See Contents Page 557

AT YOUR SERVICE

CLEPO FIELD ENGINEERS

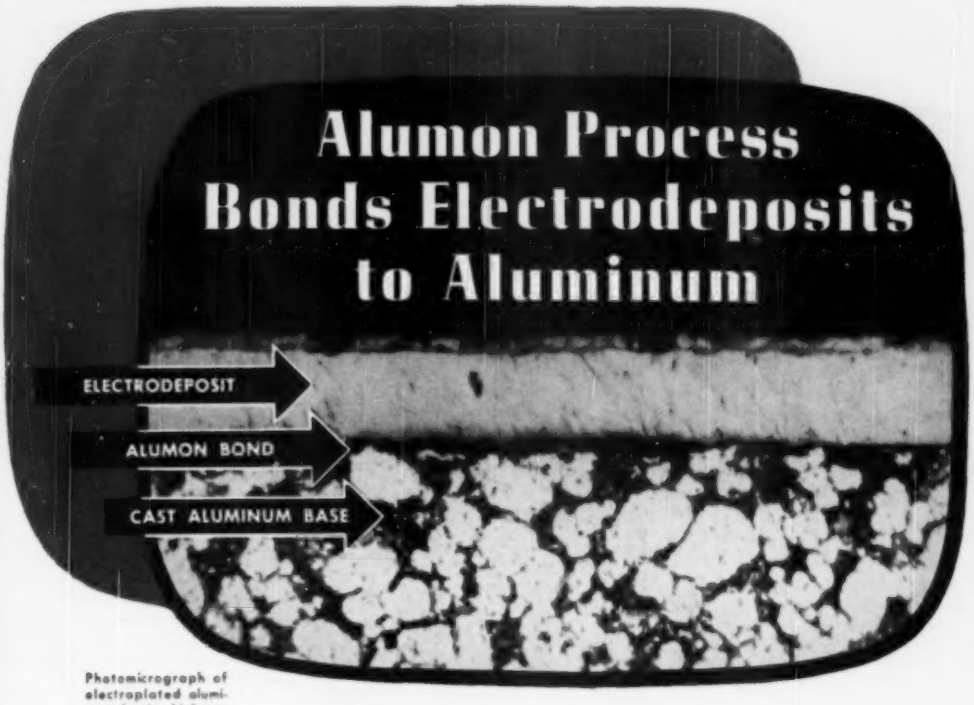
ARTHUR S. KOHLER
ROLAND J. DOUCETTE
JOHN R. GUMM
SYDNEY L. BOYAR
WILLIAM E. DONAGUE
CLEANING COMPOUNDS
EDMUND S. JEVELY
WILLIAM VOSS
JOHN M. BARRY
RAYMOND J. BERGHOLD
Take Advantage of the Field Experience of these Clepo Service Men . . . At no extra cost to you . . . Use Clepo Quality Products and Clepo Personalized Service.
ROBERT L. TUTTLE
GEORGE I. REUTER
VINCENT T. CASSWELL
EDGAR J. HOLLISTER

FREDERICK GÜMM CHEMICAL COMPANY, Inc.

538-542 Forest St., Kearny, N. J.

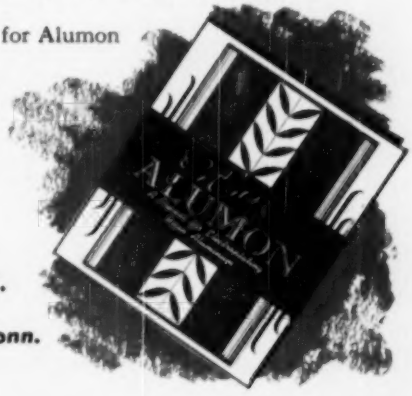
FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A 400.

Alumon Process Bonds Electrodeposits to Aluminum



Photomicrograph of electroplated aluminum showing high tensile Alumon Bond.

Hundreds of manufacturers throughout the United States are now using electroplated aluminum. The Alumon process is simple. The work is merely cleaned, dipped in acid, dipped in Alumon and is then ready for electroplating with copper, nickel, and other metals. The process is suitable for plating most wrought and cast alloys . . . The cost of using alumon is low, being less than half a cent per square foot of surface area treated. The process can be fitted easily into regular plating cycles. Write today for Alumon Process bulletin and technical data on how you can use electroplated aluminum for your products.



Enthone INC.

442 Elm Street, New Haven, Conn.

CHEMICALS
ACP
PROCESSES

Alodized
ALUMINUM
PROVIDES THE UTMOST IN METAL AND FINISH PROTECTION

A New Order of Durability

This aluminum panel was Alodized and then finished with one coat of white baking enamel. After **20,000 hours** of exposure to corrosive salt spray, the Alodized and painted aluminum is still in A-1 condition.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine ®
Duradine ®
Alodine ®
Lithoform ®
Thermal Granodine ®
RUST REMOVING AND PREVENTING
Unodine ®
Perodine ®
PICKLING ACID INHIBITORS
Rodine ® ®

The Coating

"Alodine" produces a thin, tough, tight, skin-like coating firmly embedded in the aluminum. This protective skin is extremely resistant to corrosion and bonds paint firmly to the metal for the life of the finish.

The Process

Alodizing is simple, quick, economical, easy to operate and effective. "Alodine" can be applied by immersion, spraying, or brushing. It can be utilized to advantage in your own production. Write or or call for the new descriptive folder on "Alodine".

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

Industry News

New Trade Name for Detrex Cleaning Materials. Effective immediately, Detrex Corporation, Detroit 32, Mich., is extending the use of its registered trade name "Detrex" for identification of alkali cleaning compounds, strippers, emulsion cleaners, and wet-spray booth materials that it manufactures. The trade name "Detrex" is followed by a number or letters to indicate the different materials to which it is applied. These identifying numbers or letters are not being changed. The registered trade name "Triad" is now being reserved exclusively for use in identifying Detrex Corporation's chlorinated hydrocarbon solvents for vapor degreasing and oil extraction.

Troxide in New Hands. MacDermid, Incorporated, of Waterbury, Conn. has announced the purchase of the manufacturing and distribution rights of Troxide Compounds from the Waverly Petroleum Products Company of Philadelphia. Simultaneously, MacDermid announces that Thomas F. O'Brien, who formerly headed the Industrial Chemical Division of Waverly, will take charge of a newly formed department to develop and promote Troxide and allied acid salt compounds for metal finishing and to assist in the development of new MacDermid products to be announced shortly. O'Brien, a metallurgical engineer, was formerly associated with the Philco Corporation, in addition to acting as consulting engineer to several large corporations.

The New Chicago Warehouse of United States Rubber Company is now completed. Located at S. Pulaski Road and 42nd Street in the Central Manufacturing District, it is a one-story building with 175,000 square feet of floor space on four acres of land. It supersedes the warehousing facilities at 440 W. Washington Street.

As one of the principal stocking points in the company's distributing system, the warehouse will handle distribution of merchandise for the important Midwestern area. Products to be handled include mechanical goods such as belting, hose, wire, and cable.

New Almco Distributor. The Brite Deburring Company, 2612 S. 13th Street, St. Louis, has recently been appointed authorized distributor in that area for the complete line of Almco Superspeen precision deburring and finishing barrels, auxiliary handling equipment, materials,

Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916. Copyright, 1949, by the American Electroplaters' Society, Inc. Subscriptions: Domestic and Canada, $4.00 per year, 50c per copy; Foreign, $6.00 per year, 75c per copy.

ROTARY AUTOMATICS • SEMI-AUTOMATICS • STRAIGHT LINE AUTOMATICS

• FOR HIGH PRODUCTION POLISHING AND BUFFING •

ACME STRAIGHTLINES

★ . . . have proved their worth in production!

ACME Automatic Straightline Polishing and Buffing machines offer a dependable solution to the problem of securing minimum finishing costs on many types of work.

Highly flexible as to size and arrangement these high production machines range from 10 feet to 120 feet in length with many effective arrangements of adjustable floating head polishing and buffing lathes, belt heads, conveyor, and camming and indexing fixtures.

These modern, highly efficient machines are the result of nearly 50 years of specialized experience and development . . . and, on work lending itself to this type of handling, ACME Straightlines can be relied upon to deliver high production and uniform quality finish at very low unit costs.

ACME Automatics cut high cost man-hours to a minimum and can play an important part in holding production costs down on finishing operations.

★ "ACMES" are built to exacting standards for dependable performance!

SPECIAL MACHINERY AUTOMATIC BUFFING MACHINES

ACME Manufacturing Co.

1645 HOWARD ST. DETROIT 16, MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 30 YEARS

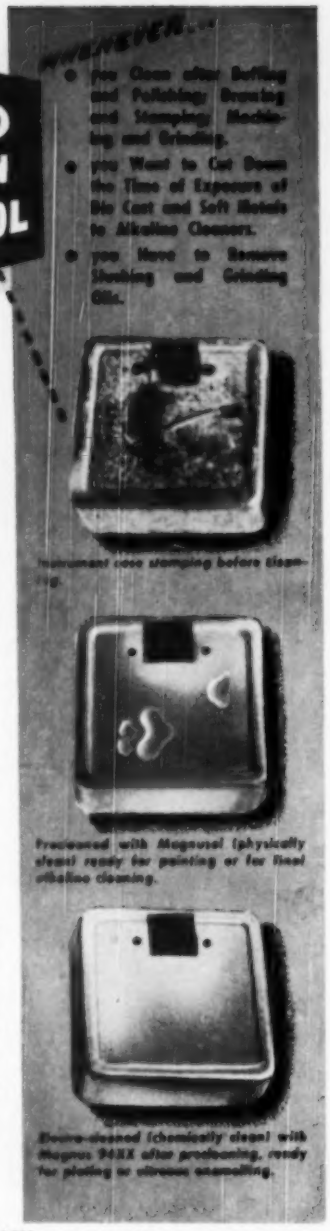
IT PAYS TO PRECLEAN with Magnusol

Precleaning with Magnusol solves the problem of removing stubborn dirts (particularly solid particles) which resist the action of vapor degreasing and alkaline cleaning solutions. It gives you a physically clean surface, ready for painting, lacquering or any other finishing operation which does not require a chemically clean surface.

If you must clean with an alkaline solution to provide a chemically clean surface for plating or vitreous enamelling, precleaning insures much more satisfactory results, with virtual elimination of rejects due to improperly cleaned surfaces.

Precleaning with Magnusol is quick, easy and sure. Work is simply dipped or sprayed with a solution made up of one part of Magnusol concentrate and eight parts of kerosene or safety solvent, then drained and flushed clean with water. The Magnusol solution is harmless to *all* metals, non-toxic and non-flammable. The entire cleaning operation can be carried out at room temperature.

Write for recommendation on your cleaning operations.


WHENEVER...
• you Clean after Buffing and Polishing, Drawing and Stamping, Machining and Grinding.
• you Want to Cut Down the Time of Exposure of Die Cast and Soft Metals to Alkaline Cleaners.
• you Have to Remove Smutting and Grinding Oils.

Instrument case stamping before cleaning.

Precleaned with Magnusol (physically clean) ready for painting or for final alkaline cleaning.

Electro-cleaned (chemically clean) with Magnus 948X after precleaning, ready for plating or vitreous enamelling.

MAGNUS CHEMICAL COMPANY • 41 South Ave., Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., 4040 Rue Masson, Montreal 36, Que.

Service representatives in principal cities

IN METAL CLEANING IT'S **Magnus**

CLEANERS • EQUIPMENT • METHODS

Industry News

and compounds. The Supersheen engineering clinic for processing samples without cost to manufacturers in the St. Louis area will be under the supervision of Richard K. Conradi, president and general manager of Brite Deburring Company.

The Job Shop Business in New York was still in the doldrums in March, according to the Monthly Bulletin of the Masters' Electroplating Association, with a rate of operations of 47.2 per cent as compared to 52 per cent a year earlier. The figure has been at about 47 per cent since January.

Films About Human Factors in Safety. A new series of six sound slide films bearing the title "Human Factors in Safety" is now available from National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill. This series is desirable in foreman training programs and was prepared to aid in such work. The cartoon technique is used in two of the films, and action shots of workers on the job add realism to the plant scenes. Narration is by professional radio announcers. These are 35mm films, timed to 33⅓ rpm sound and supplied complete with Leader's Manuals. Titles of the six films are: "The Secret of Supervision"; "Teaching Safety on the Job"; "People Are All Alike"; "Everybody's Different"; "Teamwork for Safety" and "Safety Case Histories".

L. O. Koven & Brother, Inc., Jersey City, N. J., manufacturers of boilers, tanks, piping, special process equipment and weldments, announces the installation of a new 1000-ton Bliss drawing press at their Dover plant. The press is available for parts and sub-assembly production on a jobbing or contract basis.

The Lea Manufacturing Company, Waterbury, Conn., manufacturers of Lea

Compound, Leatock and other finishing materials, has completed added storage and shipping facilities for the company's resale items. A new warehouse with railroad sliding as well as truck-loading and unloading platforms was recently finished and is now occupied in another section of Waterbury on a plot where the company is planning at a later date to build a new manufacturing plant. Main storage and handling of the resale items

McALEER Liquid Tripoli

A NEW BUFFING COMPOUND FOR FASTER, MORE ECONOMICAL FINISH

CHECK THESE SUPERIOR FEATURES OF McALEER LIQUID TRIPOLI

- ✓ Positively Non-Inflammable
- ✓ Requires No De-Greasing
- ✓ Does Not Settle (Needs No Agitation)
- ✓ A General All-Purpose, All-Metals Compound
- ✓ Used for Large and Small Parts (Automobile Bumpers to Plumbing Fixtures)

McAleer chemists and buffing engineers recently developed this new Liquid Tripoli to meet the urgent needs of large and small buffing operations for a better, more trouble-free, superior finishing compound. After months of use in several large plants where it has been enthusiastically adopted it is now offered as a thoroughly time-tested, proved product. It offers a simplified, more economical, more adaptable, usable compound for all types of metals finished for plating.

Our technical service is available to you without obligation. We can supply our own guns and pressure tanks to give a "proving-ground" test in your plant. Write, wire or see us at the Milwaukee Convention. Our catalog is FREE on request. May we help you?

A list of outstanding manufacturers including one of the world's Largest most modern plating plants use McAleer Liquid Tripoli. Names furnished on request.

McAleer MANUFACTURING CO.
ROCHESTER, MICHIGAN
PRODUCERS OF QUALITY-CONTROLLED FINISHING MATERIALS

Precious Metal Salts and Solutions

As specialists in the precious metals, we have both the facilities and the trained personnel best able to produce salts and solutions for the plater. As a result, ours enjoy a well earned reputation for high quality and consistent performance.

RHODIUM PLATING SOLUTION It was in our plant that the answer to the problem of rhodium plating on a commercial scale was found. Our solution is made under the direct supervision of the men responsible for this development.

PLATINUM PLATING SOLUTION We have developed platinum plating to a point where it stands upon a truly scientific basis. Both flash and heavy deposits are made from the same solution.

PALLADIUM PLATING SOLUTION Produces a flash plate in from 15 to 60 seconds. Heavy deposits can be made from the same solution.

CONCENTRATED GOLD PLATING SOLUTION No. 319 containing one ounce of fine gold.

CONCENTRATED REPLENISHING SOLUTION No. 320 containing one ounce of fine gold.

CONCENTRATED UNDERPLATE OR STRIKE No. 321S containing one-half ounce of fine gold.

GOLD COLORING SOLUTIONS for light yellow, red and green gold.

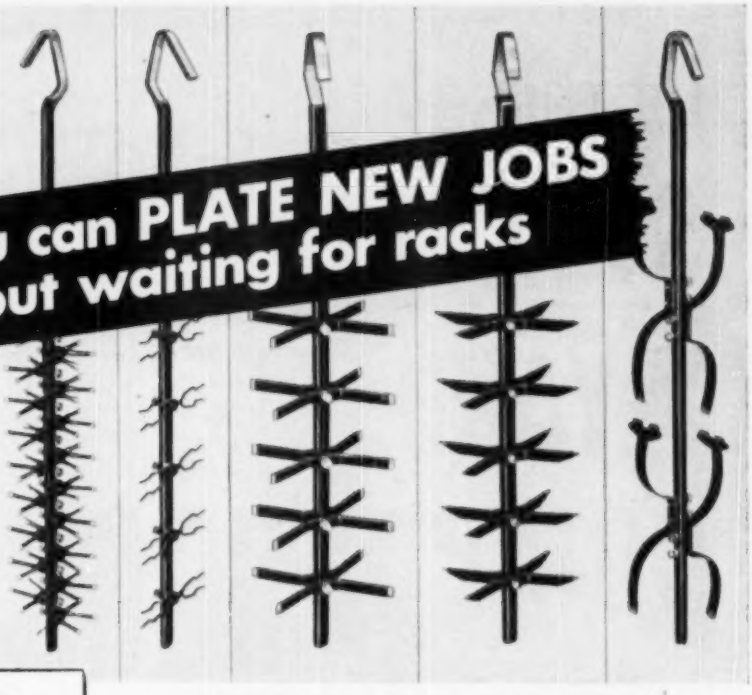
HIGH GOLD CYANIDES Our sodium-gold cyanide contains 71.5 per cent of fine gold and our potassium-gold cyanide 67 per cent as compared with commercial salts of 46 and 41 per cent. Gold content for gold content, our high gold cyanides cost you no more. We make the commercial 46 and 41 per cent salts too.

SILVER SALTS — SILVER ANODES We make silver cyanide and silver nitrate as well as silver anodes.

BAKER & CO., INC.
113 Astor St., Newark 5, N. J.

NEW YORK SAN FRANCISCO CHICAGO

Now you can PLATE NEW JOBS without waiting for racks



BELKE UTILITY RACKS

Developed in collaboration with Experienced Platers to efficiently handle a tremendous variety of plating work.

The Most Complete Plating Rack Manual *Ever Produced*

Developed by the World's Largest Manufacturer of Plating Racks

100 pages of experienced-proved information. Practical construction methods. Modern Insulations. 560 Proven Designs of Racks, Tips and Hooks. 144 illustrations of Racking Methods—showing how to rack all shapes and sizes from jewelry to bumper bars. Price $5.00 postpaid.

FIVE RACK ASSORTMENT handles 90% of all PLATING JOBS efficiently— including bright nickel and chrome

Start plating new jobs without delay: Give deliveries that get the business; Figure costs quickly and accurately — These are the things BELKE Utility Racks enable you to do.

What's more, Standardized Production gives you quality racks at a Big Saving — *about half the cost of specially designed racks.* Just read these BELKE Utility Rack Features —

Built to BELKE Quality Standards — with new Vac-Seal Removable Tip Design that gives flexibility never before available. Tips and Spines coated *independently* with BELKE Universal Plastic to withstand all cleaning and plating cycles. Spring pressure tips on all five models for copper-nickel-chrome service. Tips easily interchangeable so same spines can be used on jobs requiring different tips. Broken tips replaced in a jiffy to maintain racks at 100% capacity.

In addition, if specified, Utility Racks can be furnished unassembled — You install tips where you want them by drilling ¼" holes in spine — No tapping necessary.

Immediate Shipment—All five models in stock in 30 and 36" lengths, assembled or unassembled. Write for Bulletin 980 containing complete information or consult your BELKE Service Engineer.

Belke MANUFACTURING CO.
947 North Cicero Ave.
Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

let these

SPECIALIZED WYANDOTTE COMPOUNDS

help solve your metal cleaning problems

In the complete line of Wyandotte Metal Cleaners, you'll find a product designed to meet your particular needs.

Wyandotte Porenac, for example, is prepared especially for the removal of drawing lubricants prior to porcelain enameling, barrel plating or oxide finishing. Its concentration requirements are low – its life in solution extremely long. Porenac sharply reduces cleaning time because it eliminates the necessity for pre-cleaning. It emulsifies the toughest mineral oil compound quickly and at low cost.

Wyandotte W.L.G.* is excellent for cleaning parts in rotary washing machines between machining operations and before inspection, assembly and heat treating. It is also an efficient soak-tank cleaner. In the electro-cleaning of steels, W.L.G. can be used as pre-soak cleaner where a double cleaning cycle is available.

Wyandotte Chemicals Corporation, with its own sources of raw materials, makes the complete line of *specialized* metal cleaners. Whatever *your* cleaning needs may be, it will pay you to get in touch with your nearest Wyandotte Representative.

Wyandotte
Reg. U. S. Pat. Off.

*Registered trade-mark

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • SERVICE REPRESENTATIVES IN 98 CITIES

as well as the manufacture of Lea products are still carried on at the factory on Cherry Avenue.

New Job Plating Shop in Chicago. Cover-Rite, Inc., 1714 W. Division Street, Chicago 22, Ill., now furnishes what is claimed a complete plating service in the Chicago area. It also represents the Art Casting Company, Conneaut, Ohio, producers and platers of die castings, and the St. Louis Metal Crafts, St. Louis, Mo., platers of precious metals. A. L. Pietrowicz, President of the new company, was formerly Vice-President of Chicago Plating Company.

E. F. Houghton & Company's New Product Development Department has now been established according to G. W. Pressell, Executive Vice-President of the company.

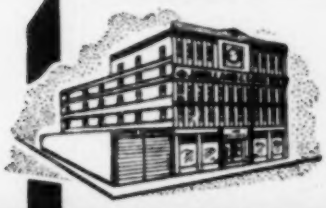
Dr. H. B. Walker has been named manager of the new department. He has been with Houghton for two years during which time he was assistant to Dr. R. H. Patch, Vice-President of Operations. In that capacity he directed application research and supervised production and engineering problems for the company.

Fourth National Instrument Exhibit to be held in the St. Louis Municipal Auditorium, September 12–16, is expected to equal last year's record. It has been limited to 20,000 sq.ft. of exhibit space, as it is felt that a larger display would not permit visiting engineers and executives to cover adequately all exhibits of scientific and industrial devices for measurement, inspection, testing, and control.

Technical sessions of the Instrument Society of America, American Institute of Physics, Industrial Instruments and Regulators Division of the American Society of Mechanical Engineers, the Instruments and Measurements Committee of the American Institute of Electrical Engineers, the Institute of Radio Engineers, the American Institute of Chemical Engineers, and the National Telemetering Forum will be held in the Auditorium.

Industrial Heating Film. A new "More Power to America" program designed to show how electric heat, properly applied, can help industry to increase production, provide better equipment designs, and improve product quality has been announced by the Apparatus News Bureau, General Electric Company, Schenectady 5, N. Y.

The Industrial Heating Program, twelfth in the General Electric "More Power to America" series, consists of a 25-minute, 35-mm black-and-white sound



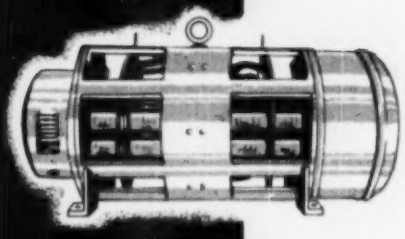
J. HOLLAND & SONS, INC.

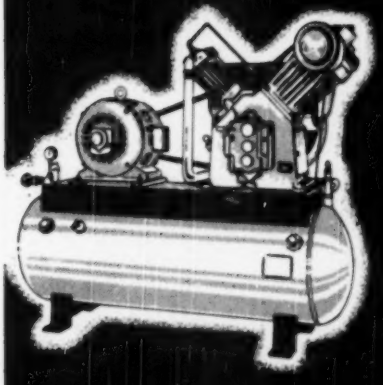
276 SOUTH NINTH STREET • BROOKLYN 11, N. Y.

DEPENDABLE...

ELECTROPLATING AND FINISHING EQUIPMENT AND SUPPLIES

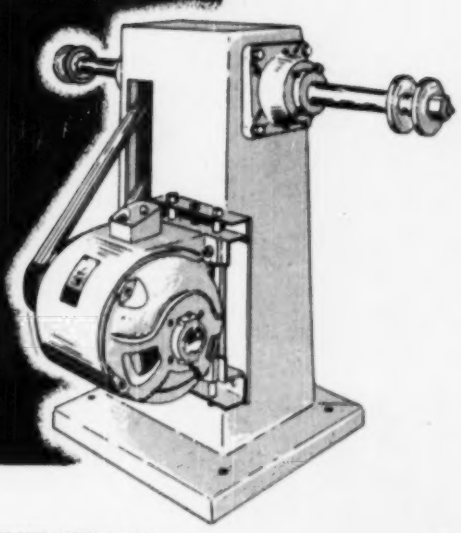
Motor Generator Sets, Plating Rheostats, Tanks for all purposes, Plating Barrels, Agitators, and practically everything for the Plating Department.





Air Compressor Units, Baking Ovens, Spray Booths, Fans, Transformers, Regulators, Pressure Tanks, and practically everything for the Spray Department.

Motor Driven Buffing Lathes, Hoods, Blowers, Ducts, Blower Systems, Floor Lathes, Scratch Brush Units and practically everything for the Buffing Department.



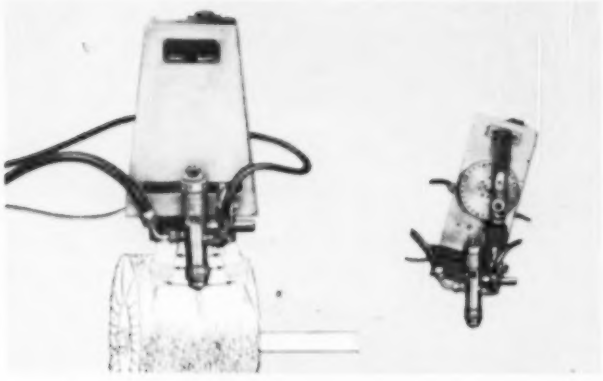
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 409.

With better COMPOUNDS for better Buffing and Polishing . . .

THE

Siefen System

Creates! Services! Supplies!



New! Spray Gun Oscillator . . .

Tremendous Success Noted in Actual Field Tests in Major Plants

In the interest of better buffing and polishing we have developed this Spray Gun Oscillator to be used with our Compounds. Tests have shown greater efficiency in spraying 4 to 12 inch width wheels. Spray Guns can be placed and operated closer to wheel than other methods and permits Compound to penetrate vacuum at face of wheel without waste!

NEW! Facts about the SIEFEN SYSTEM

Our new Manual, "The Right Way to Apply Buffing and Polishing Compounds," is now off the press. It will prove interesting to those interested in lower operating costs and higher profits.

Write for free Manual No. 500. Crammed with good, sensible advice!

THE Siefen System
SPRAY EQUIPMENT
SPRAY COMPOUNDS
SPRAY SERVICE

J. J. SIEFEN CO.

5641 Lauderdale
Detroit 9, Mich.

Industry News

slidefilm, "Heat—Where You Want It", and five different application-data booklets covering the major uses of tubular, strip, and cartridge heaters in industry for heating liquids, heating surfaces, heating process air, melting soft metals, and heating pipelines. The data booklets provide detailed application information, including necessary data and formulae for calculating heat requirements. Those desiring to purchase the program kit, including the sound slidefilm and 50 copies of each of the five application data booklets, may obtain it for $15 from General Electric district offices.

HELP WANTED

Manufacturer's Agents in certain territories to sell McKeon's "ZINC BRITE", "LIQUID SULPHUR", "TIN STRIP", etc. Sulphur Products Co., Greensburg, Pa.

PLATER-CHEMIST

Capable of assuming full responsibility for quality of work desires position in plating department.
Reply to:

P-6A, PLATING
P. O. Box 168, Jenkintown, Pa.

ELECTROCHEMIST

Ch.E. with eighteen years' extensive experience in most phases of electrodeposition, electroforming, metal finishing, etching, plastic plating and related fields. Wide experience in process development, installation, plant layout, consulting. Outstanding developments in bright metal and alloy gold electrodeposition. Prefer metropolitan New York area.
Reply to:

P-6B, PLATING
P. O. Box 168, Jenkintown, Pa.

SALESMAN WANTED

Distributor specializing in chromate coatings, brighteners, and plating equipment. Operating in Ohio and Indiana. Previous sales experience and knowledge of territory desirable. State age, experience, education, and salary expected.
Reply to:

P-6C, PLATING
P. O. Box 168, Jenkintown, Pa.

Introducing
NIAGARA
ALKALI
COMPANY

a new and dependable source of supply for TRICHLORethylene

Niagara Alkali Company, widely recognized as one of America's pioneer chemical producers, has now entered into the production of TRICHLORethylene. You are thus assured of a new and highly dependable source of supply for this important degreasing and metal cleaning agent.

NIALK TRICHLORethylene is produced in a new plant recently completed at Niagara Falls, N. Y. This new plant, which readily permits increased production facilities, is completely modern in every respect and utilizes control equipment that will satisfy the most exacting demands for a product of high quality and superior stability.

all you want to know

about NIALK TRICHLORethylene and the company that produces it is contained in a new booklet recently issued by Niagara. A copy will be sent to you immediately on receipt of this coupon:

Niagara Alkali Company, Dept. A.
60 East 42nd Street, New York 17, N. Y.

Gentlemen: Please send me a copy of your booklet on NIALK TRICHLORethylene.

Name_____

Position_____

Firm_____

Street_____

City_____ State_____

NIAGARA ALKALI COMPANY

60 East 42nd Street, New York 17, New York

DESIGN

The new Challenger Buff joins with Liquimatic, the modern liquid buffing compound, to provide an unbeatable team on your production line. This team has been created to lower your manufacturing costs. Get the Miller Story today — a request on your company's letterhead will bring complete information.

MILLER PRODUCTS

Liquimatic

We can't place too much emphasis on these facts: that Liquimatic Tripoli cuts your production costs in the following ways:

1. Liquimatic Tripoli *better than doubles the life of your BUFFS!!*
2. Liquimatic Tripoli cuts zinc die castings equal to bar compound.
3. Liquimatic Tripoli reduces industrial accidents by providing complete automatic application.
4. Liquimatic Tripoli provides every wheel with proper amounts of compound, thus reducing composition consumption.

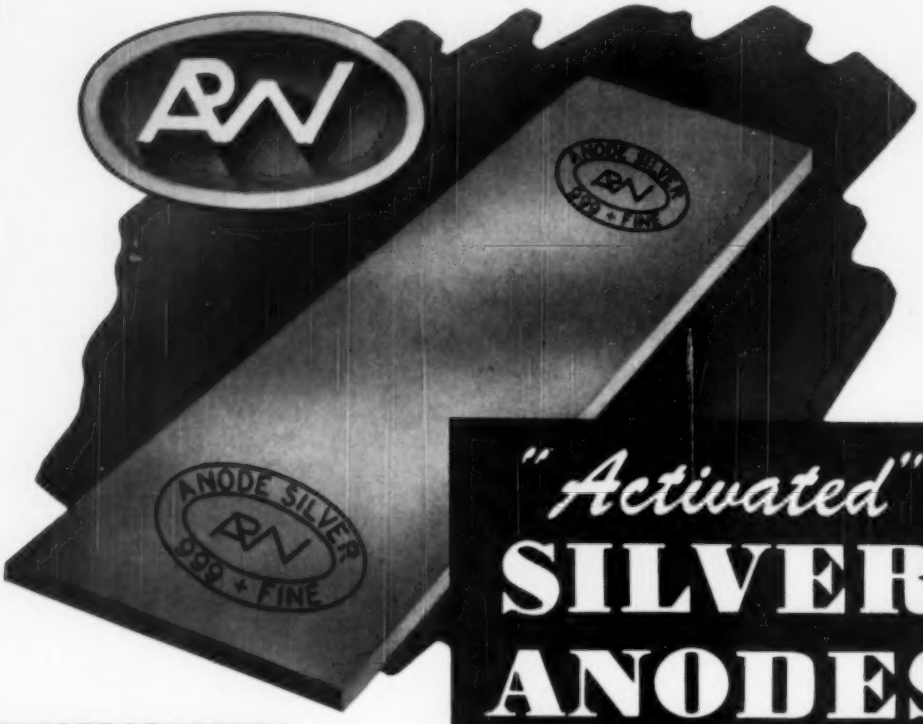
Our field application men have portable testing equipment readily available to prove the advantages Liquimatic Tripoli can bring to you. A test at your plant will show you the savings of buffing the modern way, the Liquimatic way!

ED FOR LOWER COSTS

Challenger Buffs

J. C. MILLER COMPANY
GRAND RAPIDS, MICHIGAN

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 612.



"Activated" SILVER ANODES

ELECTROPLATERS . . .

Here's an improved fine silver anode that will insure top quality plating DAY-IN AND DAY-OUT.

APW "Activated" Silver Anodes are manufactured according to an exclusive process developed by APW research and every order is "job-tested" before shipment. They dissolve more cleanly and evenly—do not darken, shed or develop passive spots.

Your saving—cleaner—brighter—better plated products.

Already widely used in the silver plating industry, these "AA" grade anodes are available in any size and quantity for prompt delivery.

Send us your next inquiry and we shall be glad to send you full information and current quotations.

Also
APW Silver
CYANIDE
100 and 1000
ounce drums.

THE AMERICAN PLATINUM WORKS
231 NEW JERSEY R.R. AVE., NEWARK 5, N. J.

7 Reasons Why They're Putting PC-7 AIR DRY-RACK COATING ON THE LINE

1 PC-7 ASSURES PROTECTION
The high solids content has been carefully blended with just enough solvents to make it compatible with most rack coatings (plastisols, rubber, air dry types). PC-7 is easily brushed over your present coatings for longer life, less maintenance . . . stellar performance.

2 PC-7 NEEDS NO BAKING
It dries quickly whether applied by brushing or dipping. No complicated techniques . . . ovens . . . or special equipment needed! Just remove metal deposits . . . rinse, dry and brush on a coat of PC-7. It air dries in an hour . . . ready for use.

3 PC-7 CUTS COSTS
PC-7 has over twice the coverage of most air dry coatings because of its high solids content. "Costs are cut in half and performance improved" say hundreds of platers who have switched to PC-7. Does a perfect patching job . . . brush right over present coatings. PC-7 repairs . . . protects and insulates perfectly.

4 PC-7 ADHERES
Adheres to metal and other coating materials like a leech . . . even boiling alkaline cleaners and chrome won't affect PC-7. Prove PC-7 yourself . . . cut away your present coating, where it has loosened at contact points, and brush on PC-7.

5 PC-7 RESISTS ATTACK
It thoroughly protects and resists all standard plating solutions . . . alkaline cleaners, acid pickling, etching and stripping baths. PC-7's outstanding performance has been proven under "on the job" surveillance for over a year.

6 PC-7 IS NON-CONTAMINATING
Leading purveyors of Bright Nickel have approved PC-7 for use in their solutions. Contamination is impossible with PC-7 because only the finest grade virgin materials are used in its compounding.

7 PC-7 IS A NATURAL
It is the natural solution to your rack coating troubles. Try a gallon. Brush it over your coated racks and see how PC-7 can reduce your cost and step up performance!

Other MUNRAY CORROSION RESISTING PRODUCTS

PC-11 PLASTISOL COATING
A heat converted 100% solids forming rack insulator for heavy duty service . . . applied by dipping . . . forms thick, tough, impenetrable membrane having *unsurpassed adhesion* to metal.

CYCLOFLEX LININGS
Rugged, chemically inert vinyl resin tank and pipe linings developed specifically for the plating and chemical industry. High bond strength, superior density, and seamless construction. Black or white in standard thicknesses of 1/8", 1/4", 1/16".

CYCLON "NPC" PLASTIC COATINGS
A high solids plastic coating, applied like paint, for general maintenance purposes where tanks, ducts, fans, walls, floors, structures, etc., are exposed to the attack of corrosive fumes, splatter, condensates and atmospheric corrosion.

CYCLON "WPS" SELECTIVE COATING SYSTEM
A systemized coating process developed for the protection of all types of metals subjected to the most severe corrosive attack, particularly, under conditions of continuous immersion.

CYCLOSEAL
A high temperature resistant baked phenolic type coating. Flexible, adherent, chemically resistant . . . for solvent and acid handling.

CYCLON "STOP-OFF" LACQUERS
Specially developed high solids lacquers for masking parts in all types of selective plating.

CYCLON TUBING
A tough, chemical handling plastic tubing, compounded in black, water-clear, or colors. Resistant to all plating solutions. Available in flexible, semi-flexible and rigid formulations.

MUNRAY PRODUCTS, Inc.
Sales Division of The POLY-CYCLO PRODUCTS Co.
12400 CROSSBURN AVE. • CLEVELAND 11, OHIO

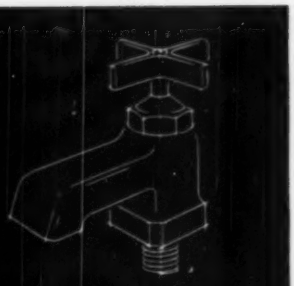
If you are...

GRINDING

POLISHING

OR FINISHING

FLAT OR



CONTOURED SURFACES

CAST PIECES

STAMPED PIECES

OR FORGED PIECES

Here are 7 reasons why the back-stand belt method is best for you . . .

1. The coated abrasive belt cuts cooler, faster than the old set-up wheel because of the longer interval between work contacts.

2. Inexperienced help can be quickly trained to operate a back-stand belt machine—freeing highly skilled personnel needed to set-up the wheels.

3. It takes only a few seconds to change an abrasive belt.

4. Temperature-controlled room for curing set-up wheels can be released for more productive uses.

5. Factory coating by a scientifically controlled process makes possible uniform grit distribution, provides a tough, sharp, fast cutting abrasive tool which assures smooth, even finishes.

6. Versatile contact wheel used with back-stand belt gives added efficiency in grinding and finishing flat and curved surfaces, and permits smooth even grinding action.

7. Production is increased because the grinding time per unit is greatly reduced.

And remember the back-stand method is a fast, economical and efficient process that can be installed at reasonable cost without discarding your polishing jack.

MAIL THIS COUPON TODAY

Please send me the booklet:
"Facts About Back-stand Belt Grinding and Polishing."

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Address _____

City _____ *Zone* _____ *State* _____

We recommend buying through your Industrial Supply Distributor

ARMOUR *Coated Abrasives*

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Personals

James H. Fry has resigned his position with the American Sugar Refining Company to accept a position as Research Chemist with the Atlas Mineral Products Company. Mr. Fry was formerly associated with Bowman Gum, Inc., Bakelite Corporation, E. I. Du Pont de Nemours & Company and Celanese Corporation.

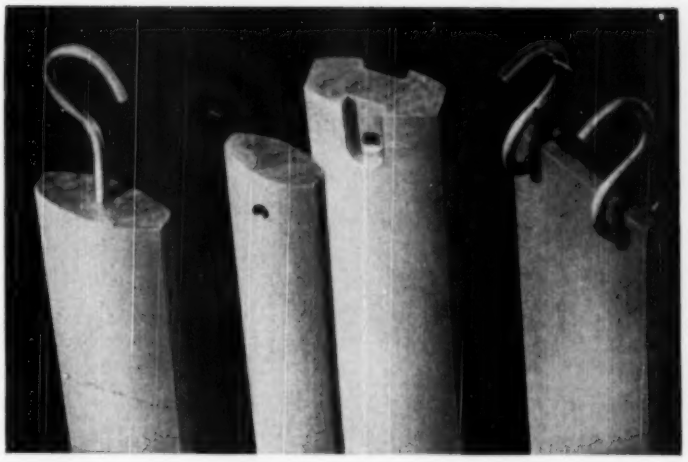
Earl W. Bennett, Treasurer since 1930, has been elected Chairman of the Board, and **Leland I. Doan** President of the Dow Chemical Company following the tragic death of Dr. W. H. Dow in a plane crash on March 31. Mr. Doan has been a Vice-President since 1938 and Secretary since 1941. **Dr. Mark E. Putnam,** a Vice-President since 1942, was named General Manager.

Bennett

Mr. Bennett remains in the important position of chairman of the company's Finance Committee. Long highly regarded in financial circles, the energetic 69-year-old Board Chairman began his career with Dow in 1900 as bookkeeper for the then infant concern. Two years later he became Auditor and in 1905 Assistant Secretary and Assistant Treasurer. He was elected to the Board of Directors in 1927 and has served on the Board continuously since that time.

Doan

Mr. Doan, a brother-in-law of the late Dr. W. H. Dow, is perhaps best known through his sales department activities which date back to 1918 when, at the age of twenty-four, he entered the Industrial Chemicals Division. He was made Assistant Sales Manager in 1922 and in 1929 became General Sales Manager. He became a member of the Board in 1935 and in 1945 moved into the newly created position of Director of Sales.



Anaconda

MEANS PURITY IN COPPER ANODES

WHEN YOU SPECIFY ANACONDA, you are assured of unexcelled purity... less than 0.01 percent of total metallic impurities... an advantage that pays off five ways:

1. **Copper goes into solution faster and more uniformly.**
2. **The highest quality deposit is produced in the shortest possible time.**
3. **Slime is reduced to an absolute minimum.**
4. **Spotting and discoloration of the deposit are minimized.**
5. **Scrap losses are exceptionally low.**

In addition to copper, Anaconda Anodes are furnished in brass and bronze... rolled Sheet or Oval... cut to your own specifications or standard sizes... drilled or undrilled... with or without hooks—also "cathode-anodes." For present or future reference, write for Publication C-5.

67018-A

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General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

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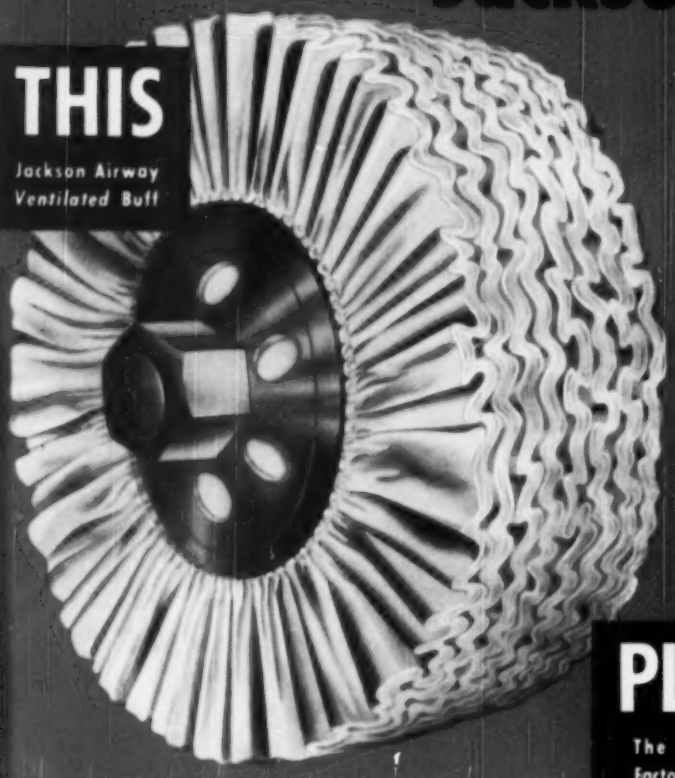
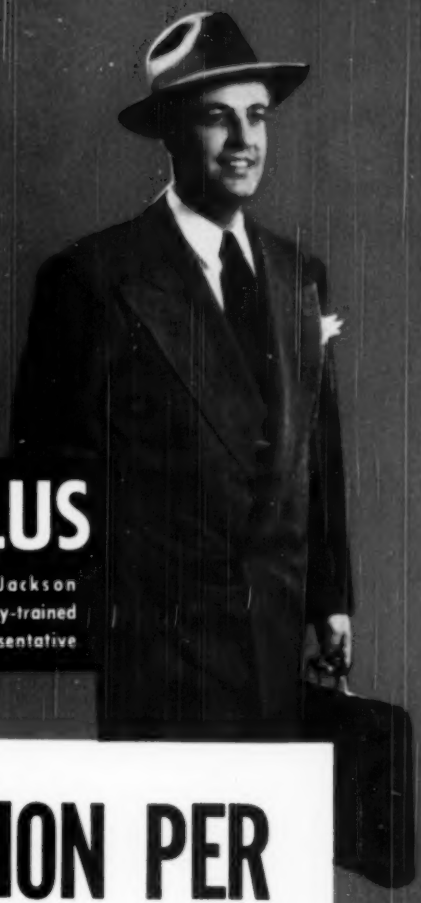
Jackson Airway the

THIS

Jackson Airway
Ventilated Buff





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The Jackson
Factory-trained
Representative

EQUALS

MORE PRODUCTION PER BUFFING WHEEL DOLLAR

Ventilated Buff is answer to quality and cost

BUY A QUALITY PRODUCT for greatest satisfaction and economy. Don't waste time and money experimenting with **"just as good"** or substitutes for **JACKSON AIRWAY** ***Ventilated*** **BUFFS.** These buffs are leading the field for maximum polishing and buffing efficiency.

Don't try to cut costs by buying cheaper buffs. **JACKSON AIRWAY** ***Ventilated*** **BUFFS** can make greater savings for you by increasing wheel-life and production . . . by producing better finishes to meet every requirement on all types of equipment.

The **JACKSON BUFF CORPORATION** has pioneered and developed the most outstanding and efficient bias type ventilated buff in the field to date.

We offer a wide range of types of buffs — and an equally wide range of prices.

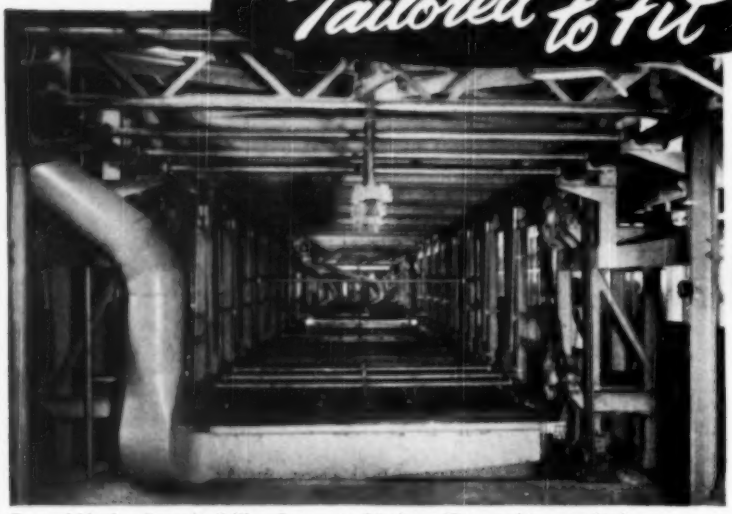
Don't take quality for granted — try the **JACKSON AIRWAY** ***Ventilated*** **BUFFS** today!

WARNING NOTICE—Jackson Buff Corp. of Long Island City, N. Y., has rights in U. S. Patents Nos. 1,972,974 and 2,140,308 which have broad claims covering an air cooled buff having means for the admission of air through the sides of the buff. Owner intends to protect all rights and stop infringement.

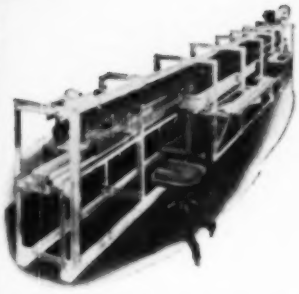
JACKSON BUFF
CORPORATION
21-03 FORTY-FIRST AVE., LONG ISLAND CITY 1, N. Y.

MEAKER Electroplating Machines

Tailored to Fit

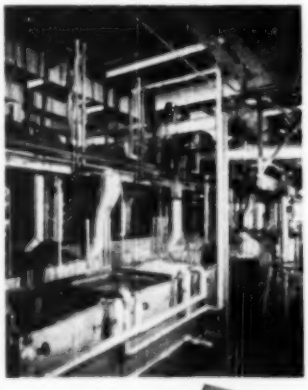


Typical Meaker Straight-A-Way Automatic Machine. This machine was built for copperplating three rows of work simultaneously. It handles 125 racks per hour that are 16 inches wide, 14 inches thick, and 70 inches long.



Meaker Special Machine designed for cleaning and silver plating small, brass contact clips. The unit is loaded at one point and the parts are carried through the operating sequence and automatically discharged into a container when completed.

Meaker Return-Type Automatic Machine for chromium plating the large variety of parts in a high-quality line of plumbing hardware.



A Meaker Semi-Automatic Machine for use in medium-output plating departments. This type equipment is used in large, job plating plants to supplement the capacity of automatic machines.

Equipment tailored to fit your requirements, making every operation in the plating sequence automatic, or as mechanized as possible, is the profitable way to handle electroplating on a production basis. This Meaker method applies equally well to departments with only moderate daily output and to the largest and heaviest automatic plating needs of the mass production plants. It offers not only a lower unit cost, but the production is increased, and a better and more uniform quality of product is assured.

Write for the Full Information. Ask for Booklet No. 148 →

50th Anniversary 1899 1949

Serving the Plating Industry with the Best, Most Up-to-Date Equipment

THE MEAKER COMPANY

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CHEMICALS FOR THE METAL INDUSTRIES

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Fluoboric Acid
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Hydrogen Peroxide
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Muriatic Acid
Nitric Acid
Potash Alum
Sodium Bifluoride
Sodium Fluoride
Sodium Metasilicate
Stannous Chloride
Sulfuric Acid
Tetrasodium Pyrophosphate
Trisodium Phosphate

STEEL

Rimming Steel Manufacture
Sodium Fluoride

Iron & Steel Manufacture
Copper Fluoride
Iron Sulfide
Sodium Bisulfite, Anhydrous
Sodium Sulfite, Anhydrous
Sulfur

PICKLING & DESCALING

Acetic Acid
Fluoboric Acid
Hydrofluoric Acid
Muriatic Acid (Hydrochloric)
Nitre Cake
Nitric Acid
Sodium Bifluoride
Sodium Fluoride
Sulfuric Acid

LIGHT METALS

Casting
Ammonium Fluoborate
Potassium Fluoborate
Sodium Fluoborate

HEAT TREATING

Barium Fluoride
Potassium Fluoride
Sodium Fluoride

FINISHING

Electrolytic Polishing
Acetic Acid
Hydrofluoric Acid
Perchloric Acid
Sulfuric Acid

Bright Dipping
Hydrofluoric Acid
Muriatic Acid (Hydrochloric)
Nitric Acid
Sulfuric Acid

Oxide Finishing—Anodizing
Hydrofluoric Acid
Nitric Acid
Oxalic Acid
Sodium Silicate
Sulfuric Acid

Galvanizing
Hydrochloric Acid
Sodium Fluoride
Sulfuric Acid

ALKALI CLEANING

Aqua Ammonia
Sodium Metasilicate
Sodium Silicate
Tetrasodium Pyrophosphate, Anhydrous
Trisodium Phosphate (TSP)

FOR METAL ANALYSES BAKER & ADAMSON LABORATORY REAGENTS AND FINE CHEMICALS

50 YEARS OF SERVICE

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FOR AMERICAN INDUSTRY

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

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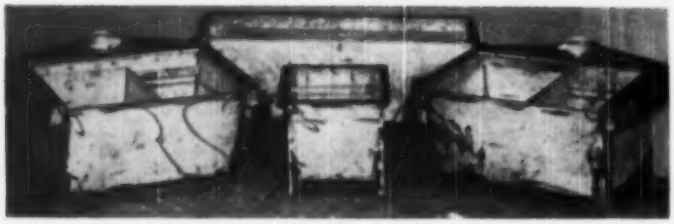
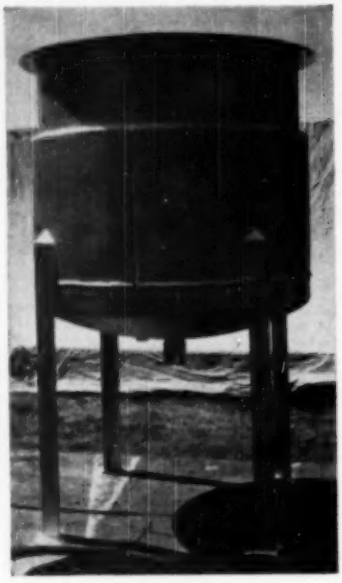
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

Stainless means
NO REPLACEMENT



BECAUSE stainless steel was found to be the most suitable material for containing the solutions used in this clearing tank cycle, stainless was used throughout. The main tanks, inner tanks, coils, casings and fittings are all impervious to corrosive attack—and all soundly and strongly Stortswelded. When stainless steel is the correct choice for your corrosion conditions you can install a complete tank cycle like this, and forget about repairs and replacements. The material cost is soon paid off by the economy of long-life utility and better operating characteristics.



Jacketed tanks of stainless steel with plain carbon steel outer jacket offer similar advantages for the handling of some acids and other corrosive chemical mixtures and solutions—protecting you from leakage losses, contamination troubles and early replacement expense. Storts customers like these economical, dependable units because the first cost is the last cost.

Other semi-precious metals may suit your conditions better than stainless steel. Storts plays no favorites—welds them all. Feel free to consult our engineering staff for help in selecting the material that will save you the most.

STORTS WELDING COMPANY
INCORPORATED
42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specifications

Personals

Dr. Putnam joined the company in 1915 as a Research Chemist and rose up through various supervisory levels to

Putnam

Production Manager. He became a director in 1941 and a Vice-President the following year. He has also been President of Cliffs Dow Chemical Company since 1939. Dr. Putnam is affiliated with many scientific societies, is credited with numerous inventions, and was actively associated with the development of a number of Dow's most important products.

Henry J. Leisenheimer has joined the Electric Products Company, Cleveland, as Manager of Export Sales. For years, he directed the export activities of the Cleveland Tractor Company, and more recently he served in the same capacity for the Hydraulic Press Manufacturing Company.

George A. Spencer now heads the Los Angeles sales office of American Nickeloid at 1323 Venice Boulevard, Los Angeles.

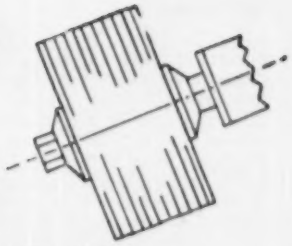
McIntyre

E. Lowe McIntyre, Jr., has been appointed Assistant Sales Manager in charge of New Market Developments with the Electric Products Company of Cleveland, Ohio. He brings to his new position broad experience: nine years of industrial selling with Westinghouse Electric Corporation and, with Jack and Heintz Precision Industries, Inc., five years of staff work and as Sales Manager of its Electric Motor Division. Educated as an Electrical Engineer, he graduated from the University of Pittsburgh in 1934.

William H. Healey, formerly associated with Arthur D. Little, Inc., has been appointed Supervisor of Market Research

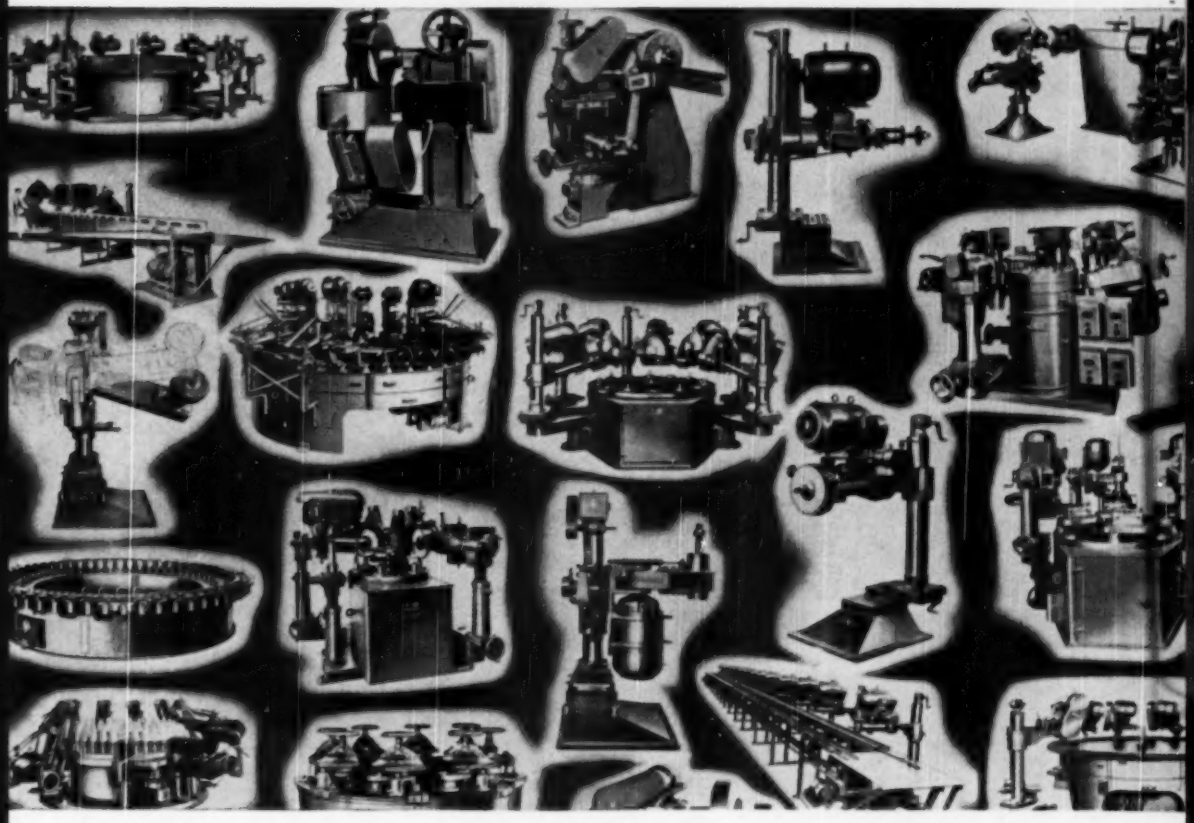
This is Eastern Headquarters for

Finishing Machinery



MORE THAN 25 YEARS EXPERIENCE — YOURS FOR THE ASKING

A complete line of Polishing—Buffing and Abrasive Belt Machinery



Strip Steel Polishers,
Tray and Reveal Buffer,
Mirror Finishing
and Glazing Machine

Screw Head Buffers,
Tube Polishers,
Special Automatic
Finishing Equipment

Semi-Automatic,
Continuous Rotary
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Polishing and Buffing Lathes
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A Field Engineering Service
is available to you

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Personals

for Antara Products, a division of General Aniline and Film Corporation. He will be concerned chiefly with the division's surface active agents and acetylene chemicals.

During the war, Mr. Healey was with the War Production Board as administrator of the allocation order governing chromium chemicals.

Dr. O. P. Watts, whose biography was published in the February PLATING, recently celebrated his 83rd birthday by getting married. The venerable professor emeritus, in his laboratory at the University of Wisconsin, still works on corrosion, a phenomenon to which he himself has developed a remarkable resistance.

Dr. Paul R. Austin, previously an Assistant Director of the Chemical Department laboratory at du Pont's Experimental Station in Wilmington, Del., has been appointed Director of the company's Electrochemicals Department's Technical Division. **Dr. Harold J. Barrett,** formerly Chemical Research Manager at the Niagara Falls, N. Y., plant, has been named manager of Field Research of the Electrochemicals Department with headquarters in Wilmington. **Dr. Campbell Robertson,** until now Manager of Chemical Research at the Perth Amboy, N. J., plant, has been named Chemical Research Manager at the Niagara Falls plant.

Dr. Earle A. Harding, who was Director of the Technical Division, and **Paul J. Carlisle,** formerly Manager of Field Research, will retire from active service about the end of this year. Until that time they will serve as special assistants to their successors.

Russell

Allen D. Russell has been named sales representative for the Michigan Chrome and Chemical Company covering the States of Ohio, Pennsylvania, and New York, as well as Canada. He succeeds **Frank Jones** who was recently transferred to the Eastern States.

After having attended the Chemical Engineering School of Wayne University, majoring in Metallurgy, he was in charge of the heat-treat and plating departments of the Timken Detroit Axle Company and then spent several years as a project engineer in the Metallurgical Laboratory of Kaiser-Frazer Corporation.

Maurice J. Krane is now Research Chemist at the Army Chemical Center, Edgewood, Md. He was previously with Bart Laboratories, Belleville, N. J., where he served as Chief Chemist. He is a member of the Baltimore-Washington Branch of the American Electroplaters' Society.

James W. Shaw, Jr., has left Reed & Barton, Taunton, Mass., where he was Plating Supervisor, and accepted the position of Plant Superintendent with Armor Bronze and Silver Company, Inc., in the same city. He is a member of the Boston Branch of the American Electroplaters' Society.

OBITUARIES

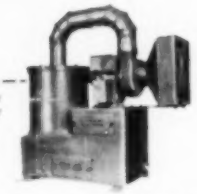
Obituary of F. F. Oplinger on page 666

†**Professor Erich Mueller,** of Dresden, Germany, one of Europe's best known electrochemists, died at the age of 78 on November 15, 1948. Professor Müller, who retired in 1935 from his position at the Institut für Elektrochemie und Physikalische Chemie in Dresden, was succeeded by Professor Friedrich Müller.

Erich Müller was born in Chemnitz and studied chemistry in Strasbourg and Berlin. Following a stay in England, he went to Göttingen in 1899 to work under Walter Nernst. He later held positions at the Technische Hochschule, Braunschweig, the Technische Hochschule, Stuttgart, and at the Institut für Elektrochemie und

Why it pays to SPIN-DRY plated work—small lacquered parts

Choose from 3 carefully engineered models...



1. **Standard Model.** Takes nearly every type of part. Built for long, trouble-free service.

Saves time . . . With the New Holland Kreider Dryer operating at 625 r.p.m. on only ¾ h.p. you can *spin-dry* a basket of parts (1140 cu. ins.) in as little as 35 seconds—no more than 2 minutes.

Improves quality . . . With a New Holland Kreider Dryer, high speed centrifugal spin-drying eliminates scarring and marring, assures smooth evenly dried surfaces, with longer lasting luster . . . fewer "rejects."

Cuts costs . . . What's more, though a New Holland Kreider Dryer occupies less than 6 sq. ft. of floor space, it's a big money saver. Power costs are low, production high—with little or no maintenance over years. And one man can operate it, easily, efficiently.

See for yourself. Write Department PL-0000 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

2. **With Auxiliary Steam Heating Unit.** Used for small parts that hold moisture—lacquered parts—or where cold water rinse is used.

3. **With Auxiliary Gas Heating Unit.** Used for small parts. Caution: Do not use with inflammable materials.

NEW HOLLAND KREIDER DRYER

for Better Plating Results

Change to **N-R**

SEYMOUR'S

Cold Solution Type

BARREL NICKEL BRIGHTENER

SEYMOUR'S N-R Bright Nickel for cold bath solutions saves you money and gives more uniform deposits in barrel plating of small articles. With an original addition of only 3 to 5 fluid ounces of N-R per 100 gallons of solution, a clean, even, decorative deposit of bright nickel up to .0001" can be obtained. Only 1 to 2 fluid ounces of N-R are needed per 100 gallons per load of work thereafter.

Seymour N-R cold type Brightener is simple to maintain and easy to control. Deposits are adherent to properly cleaned base metals, except zinc base direct, and may be chromium plated without prior buffing or wiping. Write for Bulletin No. 8 containing complete details.

Other Seymour Bright Nickel Processes are available for specific plating needs. Tell us your requirements.

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Buffalo 13, New York

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Newark 5, New Jersey

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16 Cherry Avenue
Waterbury, Connecticut

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442 Elm Street
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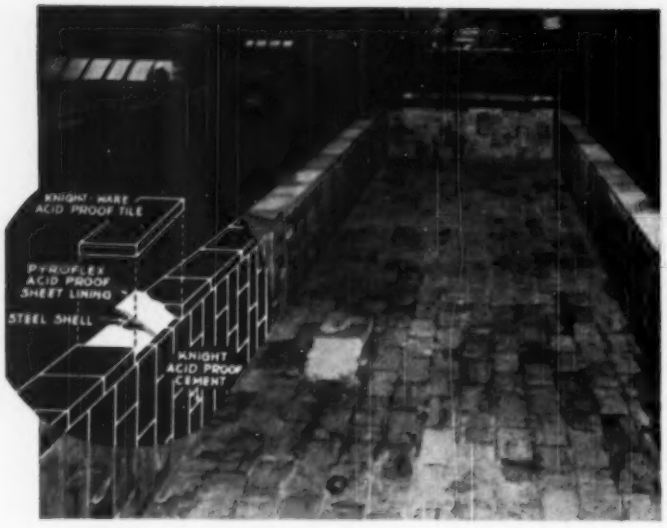
SMITH CHEMICAL & SUPPLY COMPANY
70 Clifford Street
Providence 3, Rhode Island

THE SEYMOUR MANUFACTURING COMPANY, SEYMOUR, CONNECTICUT

SEYMOUR



This tank will live to a ripe old age because it is PYROFLEX-Constructed

Pickling tanks lead a tough life. The Pyroflex-Constructed Pickling Tank above is in use in a continuous strip steel line in a large Ohio steel mill. It is subject to constant attack by acids, steam and other corrosive agents. To make this tank completely corrosion proof, Knight engineers specified Pyroflex sheet lining heat bonded to the steel shell, then covered with Knight-Ware Tile set in acid-proof cement. The result is a tank completely resistant to this highly corrosive type of service.

However, Pyroflex Construction is not always composed of these same materials. In designing various corrosion proof constructions such as tanks, chlorinating towers, floors, sewers, fume ducts, etc., Knight engineers may incorporate ceramics, carbon, glass, plastics or any other materials best suited to the individual situation. Consequently Pyroflex-Constructed units live to a ripe old age with less "down-time" and lower maintenance costs.

When making inquiry regarding Pyroflex Constructions, please specify type of equipment in which interested, service conditions involved, etc.

Maurice A. Knight 605 Kelly Ave., Akron 6, Ohio
Acid and Alkali-proof Chemical Equipment

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 423.

Physikalische Chemie in Dresden. He held the degree of Doctor Honoris Causa from Stuttgart and during his many years of teaching drew students not only from Germany but from all over the world. Among his many publications are his papers on the electrolysis of alkali chlorides and on the theory of chromium plating. His best known books are: "Das Eisen", "Elektrochemischer Praktikum", and "Die Potentiometrische Massanalyse".

†**J. L. Downes** died on April 9 in New Haven Hospital after a long illness. Born in Wallingford, he had been employed by Remington Rand Company, Inc., as Plating Supervisor in its Middleton, Elmira, N. Y., and Hamilton, Ont., plants. He was a Charter Member of the New Haven Branch of the American Electroplaters' Society and served as National Vice-President a number of years ago.

Surviving are his wife, Anna Griffin Downes, a son Robert who is a student at Catholic University, Washington, D. C., and a brother James of Meriden, Conn.

†**Andrew Sorgenti,** head of the Wenzel Plating Company, New York City, passed away in Miami, Florida on Friday, March 25.

An old-time plater, he had been foreman of the company for some years when he took it over in 1918. He was widely known and respected in the industry and will be missed by a host of friends.

Mr. Sorgenti leaves a widow, Mrs. Josephine Sorgenti, a daughter, Mrs. Nicodena Redling, and sons Pasquale and Luca, all of whom will continue in the firm; two brothers, Joseph and Louis Sorgenti, and six grandchildren are other members of the immediate family.

†**Carl Dennis,** a pioneer manufacturer of buffing and coloring compositions and a member of the Los Angeles Branch of the American Electroplaters' Society for 18 years, passed away on February 25 at the age of 72.

He was interested in Matchless Metal Polish Company of Glen Ridge, N. J., for a number of years until 1927 when he moved to Los Angeles and became affiliated with Los Angeles Chemical Company. Here he supervised composition manufacture until he became hospitalized in the Cedars of Lebanon last October.

Dennis was born in Olatha, Kans., and funeral services were at Forest Lawn, Glendale, Calif. He leaves his wife Mattie Dennis of Los Angeles and a nephew, Edwin Dennis of Kansas City.

†**William H. Harney,** with his brother John partner in Fremont-Old Colony Plating Company, passed away on April 29 in his 55th year. He was a member of the Boston Branch of the American Electroplaters' Society.

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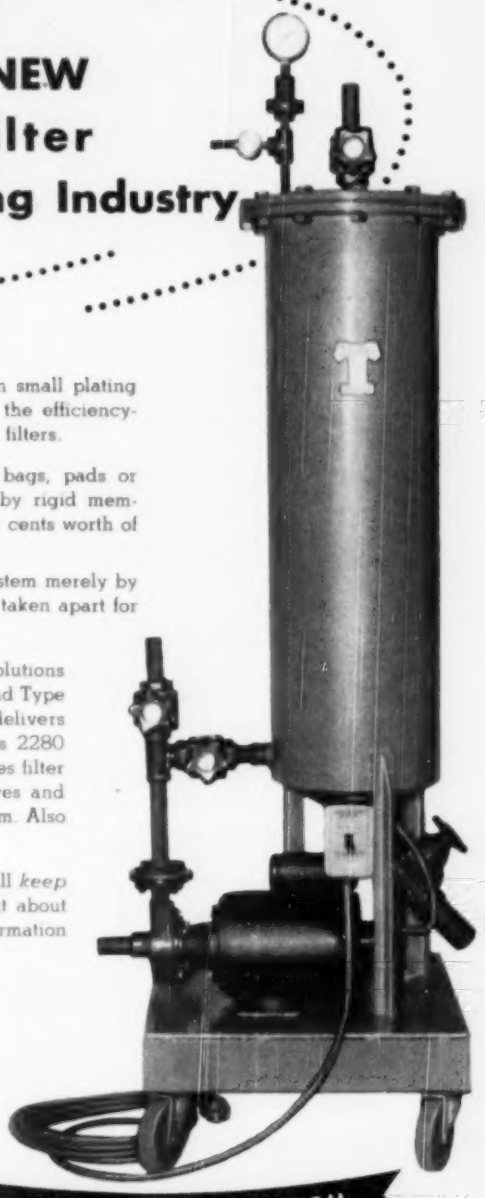

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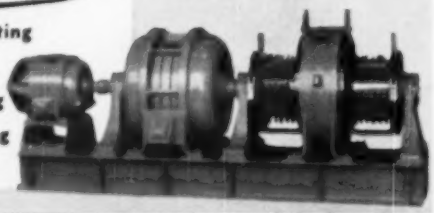

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The Mailbox

Subject: New Facts About Electroplated Nickel Discovered by Research

DEAR SIR:

I am writing with regard to the News Release in which your Research Committee reported its discovery that porosity of electroplated nickel foil varies with the crystal structure of the deposit.

We in this country look up to the American electroplating trade which, we recognize, is in certain respects ahead of us, but I really cannot allow you to get away with this.

The fact that the porosity of an electrodeposit varies with the crystal structure of that deposit has been proved by Dr. Steer of the Rover Company, Limited, Birmingham, England, who reported his results in November, 1946 before the Electrodepositors' Technical Society in Birmingham, and again before the same Society at its International Electrodeposition Conference in September, 1947. His latter paper was entitled the "Mechanism of Exfoliation of Electrodeposited Layers". In October, 1948 at a meeting of the Electrodepositors' Technical Society in Birmingham photomicrographs demonstrating the phenomenon were shown on a screen in natural color at 2000 diameters, and I understand that his work in this field is also to be reviewed in the paper which he is reading in September of this year to the Australian Institute of Metals at its Symposium in Melbourne.

I note that Dr. N. Thon is carrying out further research to determine whether nickel baths operating under commercial conditions can be modified to give a crystal structure with an improved corrosion resistance. I must congratulate you on your enterprise in the matter of these research projects; their results will be of value to industry throughout the world.

Yours faithfully,
C. R. DRAPER
Editor, Electroplating
(England)

DEAR SIR:

I appreciate this opportunity to comment on Mr. Draper's letter.

In its study of the nature and effects of porosity in electrodeposits, Project No. 6 has found it useful to distinguish between two different types of porosity. One type, already familiar, arises most frequently from such causes as the presence of suspended matter in the solution, release of dissolved gases, defects in the basis metal itself or owing to faulty preparation, and so on. Pores of this type are large enough to be seen, when suitably illuminated, either with the naked eye or with the aid of a microscope.

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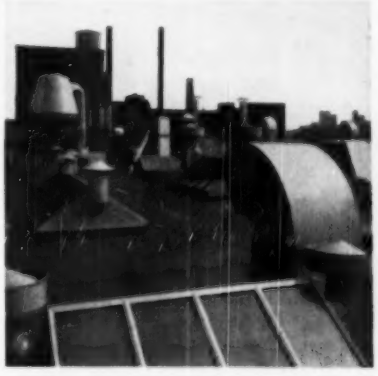

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The Mailbox

From a practical standpoint, it is important to recognize that this type of porosity is more or less accidental in character and can be prevented for the most part by proper measures in each case. Dr. Thon has suggested that this type of porosity be referred to as "gross porosity" to distinguish it from the other type which he calls "intrinsic porosity". The latter is concerned with openings of smaller size. It is hoped to gain some idea of the size of these openings by studies now under way. It has been established that the intrinsic porosity varies, not only for each different metal, but also with the thickness of the deposit and the conditions under which it is formed. The intrinsic porosity decreases for any given metal with the thickness, slowly at first, but quite sharply once a certain critical thickness is passed. The critical thickness is characteristic of the metal.

As stated in the News Release, it appears that in some instances, at least, variations in intrinsic porosity are associated with differences in crystal structure.

While the term "intrinsic porosity" seems to be well justified by the characteristics enumerated above, there is evidently danger of confusion arising from the use of the word porosity in more than one sense. Accordingly, it has been suggested that "permeability" be substituted for "intrinsic porosity". This fits in well with the method of measurement used in studying this phenomenon, and at the same time leaves the word porosity free for use in the generally accepted sense without danger of confusion. Hereafter, therefore, Project No. 6 will use the term permeability rather than porosity to describe the new type of porosity which has been discovered in this research.

Now with this distinction in mind, it is easy to see how the unfortunate use of the word porosity in the News Release to which Mr. Draper refers in his letter has led him to confuse Dr. Steer's findings with the findings of Project No. 6. The phenomena described by Dr. Steer are visible under the microscope, as Mr. Draper points out, and therefore are of the dimensions of Dr. Thon's "gross" porosity rather than "intrinsic" porosity or permeability to which the News Release refers.

The Research Committee and all concerned with Project No. 6 are glad to have this opportunity to clear up Mr. Draper's misunderstanding of the News Release. It is hoped that this explanation will also help to clear up any confusion about this on the part of any other readers. Obviously, there was never any thought of disparaging Dr. Steer's work or claiming priority for the contributions he has made.

LOUIS WEISBERG, Chairman
Research Committee

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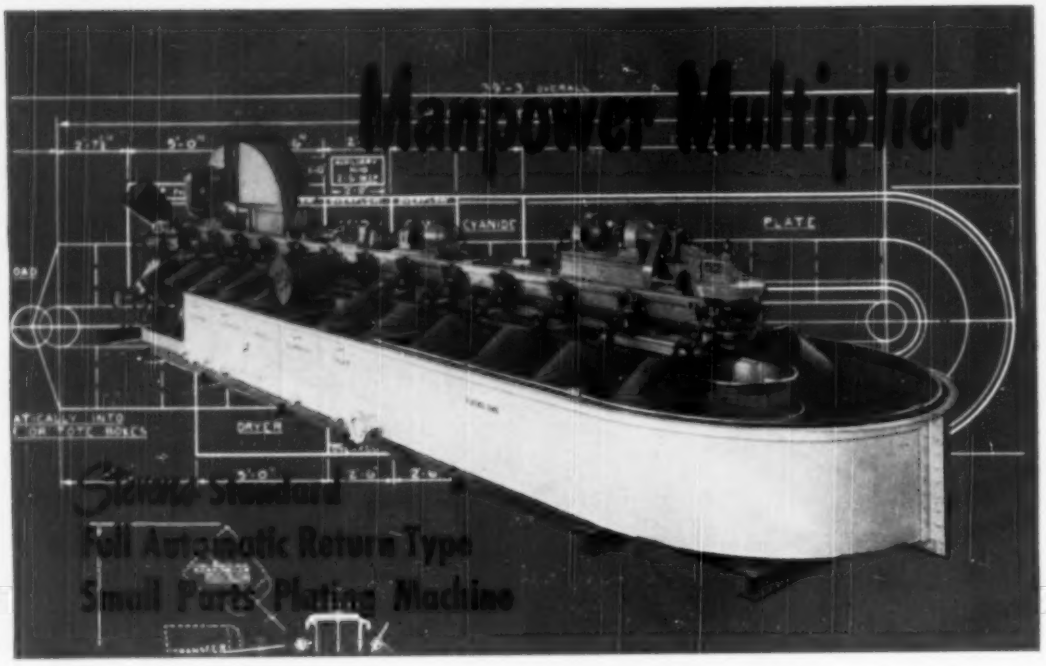

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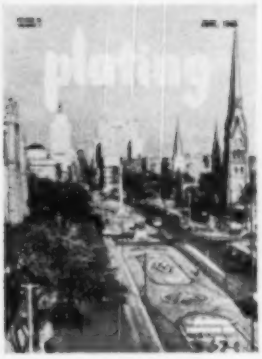

This month's cover photo shows a view from Milwaukee, the host city to the American Electroplaters' Society's convention on June 27–30. See the complete program which starts on page 581.

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plating

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Editorial

Paying the Premium

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No company and few individuals can accumulate enough money to insure their future. Needed insurance, however, is available, and while its cost is relatively low, it has to be paid for. A company's best insurance, as well as that of an individual, is possession of know-how.

The Milwaukee Convention of the American Electroplaters' Society on June 27–30 offers such insurance to both companies and individuals, formally at the technical sessions and informally through shop talk during free hours. Each plater, be he a shop man, a chemist or metallurgist, or an office worker, will learn new things which will be helpful to him and make him more useful to his company. To insure his own future he should make every effort to attend, and each company concerned with its future should do everything to facilitate his attendance.

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Gustaf Soderberg

COBALT-NICKEL DEPOSITION IN ELECTROTYPING

R. F. LEDFORD

Hanson-Van Winkle-Munning Company, Chicago, Illinois

PROBABLY NO ONE INVENTION has contributed as much to progress as the printing industry. Man began to record his activities and thoughts at the very beginning of history, first in pictures, later in pictographs, and finally by means of the alphabet. Printing with type was developed first in the 15th Century; from that time on improvements in equipment, technique and material have been many and printing has become an industry with an influence on man's way of life difficult to overestimate.

In the graphic arts industry, an adjunct to the printing industry, nickel plating has been used for many years in the manufacture of electrotypes and stereotypes. In the case of the stereotype one deals with plating of nickel upon the pre-cast printing surface and the final nickel surface is actually the working surface in the printing process. Electrotypes are electroforms, one of the oldest known kind of electroformed articles[1]; their working surface is the film of nickel first deposited. While there is some question as to who was the originator of electrotyping, the date of its development has been set at 1839; the first printed matter produced from the copper electrotype was published in 1840.

One of the advantages of electrotyping is that as many low-cost reproductions as necessary can be from the relatively expensive master plate. For example, a photo-engraving on copper when used as the printing surface has a comparatively short life; if this photo-engraved plate had to be replaced before the press run was completed, the cost of duplicating it would be prohibitive. Even if this photo-engraved plate had been nickel plated, its life would have been increased somewhat but not sufficiently for long runs. Hence the electrotype. Gonser and Epstein[2] have collected data on the life of various printing surfaces as shown in Table I. In considering the life of an electrotype one should remember that failures occur not only because of wear but also for mechanical reasons, for example, because of irregularity in the press or in the placement of the electrotype. However, the values listed by Gonser and Epstein do serve to compare the life of the different types of shell.

Steps in Manufacture of Electrotypes

In making an electrotype, the first step is to produce a mold which retains all the detail of the master plate. Depending upon the type of job, the material for the mold will be either lead, Teneplate, wax, or plastic. Assuming that a plastic mold were used, the material would in all probability be Vinylite, a thermoplastic possessing certain properties essential for good molding material. (Fig. 1.) The treatment of the mold would include spraying a conductive film of silver upon the surface to be plated, thorough rinsing, and nickel deposition. The thickness of the nickel depends to a great extent upon the length of the printing run and normally falls between 0.0005 and 0.002 inch. After nickel plating, the case is transferred to an acid copper solution and plated with copper to a thickness between 0.006 and 0.10 inch. The purpose of the copper is to increase the rigidity of the

TABLE I. NUMBER OF IMPRESSIONS OBTAINABLE WITH VARIOUS ELECTROTYPES

Kind of Electrotype	Average Number of Impressions
Original Copper Half Tone	50,000
Original Zinc Etching	30,000
Flat Copper from Type Form	150,000
Flat Copper from Half Tone	100,000
Curved Copper from Type Form	300,000
Curved Copper from Half Tone	200,000
Flat Nickel from Type Form	600,000
Flat Nickel from Half Tone	300,000
Curved Nickel from Type Form	1,000,000
Curved Nickel from Half Tone	800,000

electroformed shell so that it can be easily removed from the mold without distortion or tearing of the nickel deposit. Fig. 2 is a shell that has been made by nickel plating and copper plating, and removed from the plastic mold. Fig. 3 illustrates the appearance of the shell after it has been supplied, by casting, with a white-metal backing, and tooled, ready for the press.

Requirements

A careful consideration of all factors involved, as well as a search of the literature, indicates that the nickel deposit must meet certain requirements and hence have certain properties. It should also be noted that these properties must be controllable.

One of the requirements of the deposit is that it do not curl, wrinkle, or pull away from the mold, thereby distorting the printing surface. Several authors in discussing this phenomenon have attributed it to *internal stress* in the nickel deposit. Martin[3] pointed out that in most commercial plating applications the presence of stress in the nickel deposit is not readily apparent because the plater has been successful in obtaining adhesion to rigid objects which anchor or hold the deposit, while in nickel plating on a surface with a low order of adhesion the amount of stress in the deposit assumes greater importance. Electrotyping requires that the adhesion of the deposit to the mold be of low order so that the shell can be readily removed without tearing. It has been reported that where the internal stress in the deposit is too high, it manifests itself by distortion of the printing surface or curling at the edges[4]. Investigators have many times considered the possibility of changing both the composition of the electrolytes used for electrotyping as well as the operating conditions in order to produce deposits low enough in internal stress to permit fidelity of reproduction. Normally electrodeposited nickel is in tensile stress, the amount of stress depending upon the type of solution and the operating conditions. Some electrodeposited nickel may even be under compressive stress.

Another requirement that should be considered is *hardness* of the deposit. Electrotype plates are subject to wear, and experience has indicated the value of producing a deposit that has high resistance to abrasion. For this reason chromium is sometimes deposited on the face of electrotypes after they have been cast, with the result that the life of the plate is usually greatly increased. *Ductility* is another requirement, because plates are many times formed after plating and brittleness might result in cracking of the deposit.

Investigation of Cobalt-Nickel Deposits

For some time it has been the author's opinion that the cobalt-nickel alloy deposits, which have been used successfully on stereotypes, should be investigated for use in electrotypes. A review of the physical properties of different nickel deposits shows that cobalt-nickel deposits can be produced that are hard and at the same time relatively ductile. The electrolyte is simple to maintain, and the physical properties of the deposit are controllable. The unknown quantity was the extent of distortion or curling of the deposits produced on plating from this solution, and what changes in operating conditions would have on this phenomenon which has been attributed to contractual (tensile) stress.

Fig. 1. Electrotype mold of Vinylite plastic

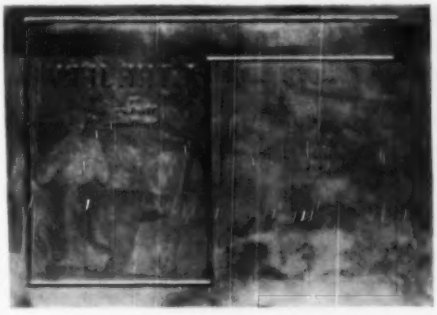

Fig. 2. Shell of electrodeposited nickel and copper after removal from the mold

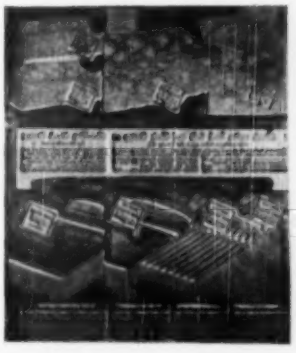

Fig. 3. Shell after the white-metal backing had been cast on and after tooling

Fig. 4. Standard test specimen used in the investigation, a Vinylite mold of the letter R with a copper screen molded into the surface for contact, the mold being silvered on one side only

Throughout the investigation, we used current densities of 50 asf or higher. This we considered important because the present solutions for nickel deposition on wax or plastic molds are operated at current densities of 10 to 20 asf, and the advantage of producing satisfactory shells at higher current densities is obvious. The purpose of the investigation, therefore, was to determine if we could produce cobalt-nickel deposits satisfactory for electrotypes at a current density of 50 asf and higher and at the same time retain all the the desired physical properties.

In the early stages of the investigation most of the work was confined to the laboratory, and the first consideration was to find a simple method for determining the effect of changes in operating conditions and variations in solution composition on the deposit. This method not only had to be simple but at the same time it must quickly produce visual evidence of whether or not the changes were desirable for the application. The method chosen was to use as a standard test piece a block letter R molded in Vinylite, which had been silvered on one side only (Fig. 4). At one end, prior to silvering, there was molded into the Vinylite sheet a piece of copper screen which served as contact for the negative lead from the d.c. power source. After the test piece had been plated to a predetermined thickness, which in most cases was of the order of 0.001 inch, the deposit was stripped by trimming the edges and flexing the cathode. In this way we were able to study the effect of changes upon the deposit while working on type mold under production conditions.

The second consideration was to treat the laboratory solution only in a manner that could be quickly and easily carried out in a production installation. For this reason the purification treatment was limited to (1) the use of activated carbon and activated clay in amounts of 5 pounds each per 100 gallons of plating solution, followed by filtration, and (2) subsequent electrolytic purification, using a curved steel cathode and employing a current density of 5 asf based on the projected area of the cathode, until an equivalent of 10 amperes per gallon had been passed through the solution. Agitation was used in the purification treatment, as well as in most of the plating tests. The first treatment served to remove organic contaminants and the second treatment to take care of troublesome metallic contaminants, both of which might have been introduced through the commercial grade of salts used in the make-up of the solution.

Fig. 5 is an excellent illustration of good and bad nickel deposits insofar as the application to electrotypes is concerned. Note that the letter R to the left is perfectly flat and shows no evidence of wrinkling on the printing surface, while that to the right is badly wrinkled. Any distortion of the printing face is, of course, objectionable. This is one of the phenomena that had been attributed to tensile stress in the nickel deposit. However, before resorting to measurements of stress or of the physical properties of the deposit, it was our intention to investigate the effect of variations in the operating conditions and the concentration of the both constituents upon the standard plastic-mold test piece.

The formula of the cobalt-nickel solution used in

Fig. 5. Examples of perfectly flat nickel deposit at left and wrinkled nickel deposit at right

TABLE II. BATH COMPOSITION AND OPERATING CONDITIONS USED IN THE INVESTIGATION

Salt	Concentration	
	g/l	oz/gal
Nickel sulfate	240	32.0
Nickel chloride	22.5	3.0
Boric acid	30.	4.0
Ammonium sulfate	1.5	0.2
Nickel formate	15.	2.0
Cobalt sulfate	2.63	0.35
*p*H, electrometric	4.7	
Temperature	48° C (120° F)	
Cathode current density	5.4 amp/dm² (50 asf)	
Anode	Nickel with approx. 1 per cent cobalt	

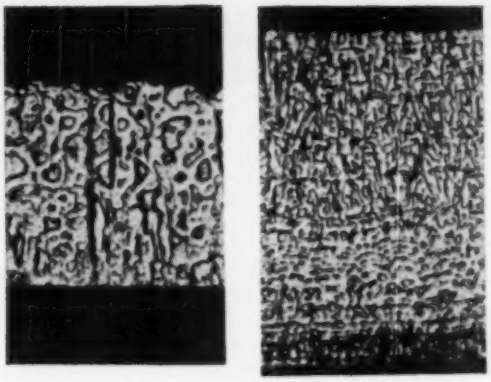

Fig. 6. Photomicrographs of cobalt-nickel deposits produced according to Table II, except that the deposit at the right was made in a bath of pH 3.3 instead of 4.7. 1000X

the investigation is shown in Table II. The operating conditions listed are those that produced satisfactory deposits, although, as will be shown, it is possible to vary both concentrations and operating conditions with satisfactory results. In the preliminary work a lower *p*H and a lower temperature were used than those shown in the table and this resulted in deposits that were somewhat distorted, as shown to the right in Fig. 5.

Effects of Variables

pH. Judging from the simple panel test we found that we could produce satisfactory deposits at a *p*H between 4.2 and 5.5, electrometric. We did not investigate the range beyond 5.5. Below a *p*H of 4.2 the nickel deposits had a tendency to wrinkle. The photomicrographs in Fig. 6 show deposits produced under the conditions given in Table II, except that the cobalt-nickel deposit at the right had been made at *p*H 3.3 electrometric. Some slight grain refinement and a tendency to lamination will be noted in the deposit produced at the higher *p*H.

Solution Temperature. Preliminary work with the Vinylite test mold indicated that it was difficult to produce satisfactory deposits at temperatures below 110° F and above 135° F. We attribute the difficulty at the higher temperature to its effect on the Vinylite mold. Below 110° F there was some evidence of wrinkling in the nickel deposit, and the same condition appeared to exist at a temperature above 135° F.

TABLE III. COMPOSITION AND OPERATING CONDITIONS OF A STANDARD ELECTROTYPING SOLUTION

Salt	Concentration g/l	Concentration oz/gal
Nickel sulfate	70.0	9.0
Ammonium chloride	6.0	0.75
*p*H, electrometric	6.1	
Temperature	35° C (95° F)	
Cathode current density	1.3 amp/dm² (12 asf)	
Anode	95/97% cast nickel	

Cobalt Content. The cobalt concentration of the solution was varied somewhat by the addition of cobalt sulfate. An examination of the Vinylite panels in Fig. 7 indicates no visual effect from variation of the cobalt content, although, as might be expected, the variation did have some effect upon the hardness of the deposit. Thus a deposit produced in a solution containing 0.2 oz/gal cobalt sulfate under conditions set forth in Table II had a Vickers hardness of 237, and with 0.5 oz/gal of cobalt sulfate, the Vickers hardness was 514. As a comparison, a deposit from a standard operating electrotyping solution as shown in Table III had a Vickers hardness of 280. The ductility of the deposit with the Vickers hardness of 514 was higher judged from bend tests than that of the deposit with the Vickers hardness of 280.

Current Density. Here again we have taken advantage of the simple method of depositing nickel on a molded Vinylite R. It was our belief that the effect of current density would be extremely important as it was our purpose to work with current densities above those now in general use in the electrotype industry. It will be noted in Fig. 8 that there is no visual effect on the deposit by varying the current density.

Nickel Content. The nickel concentration was varied from 6.0 oz/gal to 12.0 oz/gal without any noticeable effect on the deposit. Blum and Winkler[8], describing the effect of variations in the nickel concentration of

At left: Fig. 7. Lack of visual effect of cobalt sulfate concentration. From left to right, 0.35, 0.70, and 2.0 oz/gal cobalt sulfate. At right: Fig. 8. Lack of visual effect of cathode current density. From left to right, 50, 75, 100, and 120 asf

the ordinary electrotyping solution, state that, in general, if the nickel content is raised, there is an increase in both the rate of covering and the tendency of the nickel to curl and crack. The most favorable content for wax molds is given as about 9.0 oz/gal of nickel sulfate, while for lead molds it is possible to use a higher concentration of nickel sulfate, such as 18.0 oz/gal.

Nickel Chloride Content. This constituent was varied in concentration from 0.0 to 6.0 oz/gal without noticeable effect on the deposit.

Ammonium Sulfate Content. Variation from 0.0 to 4.5 oz/gal was without visible effect on the deposit. Martin[3] noticed a pronounced effect upon the internal stress of the deposit when ammonium sulfate was added to a high-*p*H bath. We did not make any stress measurements but did observe some hardening and reduction of ductility of the deposits in the bend test.

Boric Acid Content. This constituent was varied from 0.0 to 5.0 oz/gal without any noticeable effect on the deposit. There is some advantage to the use of boric acid because its buffering effect permits plating at higher current densities.

Nickel Formate Content. Variation from 0.0 to 5.0 oz/gal did not introduce either curling or distortion in the nickel deposit. Nickel formate has some buffering effect at high *p*H values but very little at low *p*H.

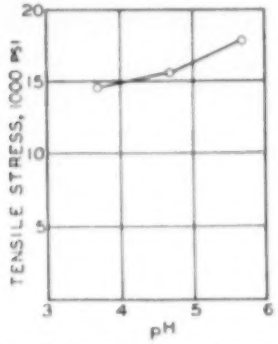

Fig. 9. Effect of bath pH on stress in deposit

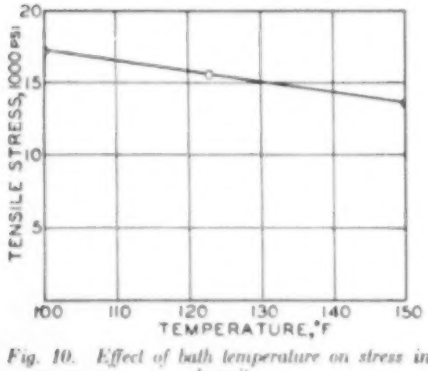

Fig. 10. Effect of bath temperature on stress in deposit

Stress Measurements

It is seen that the two factors that had the most pronounced effect on curling or wrinkling of the deposit were the *p*H and the temperature of the solution. It was therefore considered advisable to obtain stress measurements on the deposit with variations in these two factors. The method outlined by Soderberg and Graham[4] was used. In each determination 0.1 mil of nickel was deposited from the solution shown in Table II upon one side of a 2.5 x 0.5 x 0.002 inch thick copper strip. The resulting curvature of the strip was measured at 64° F.

Fig. 9 illustrates the effect of *p*H. These results indicate that the difficulty in producing satisfactory deposits free from wrinkle at *p*H below 4.2 electrometric cannot very well be attributed to the internal stress of the deposit. Contrary to popular conception, the wrinkling of the deposit was not accompanied by an increase in tensile stress; we were able to produce deposits free from wrinkle at the higher *p*H values which also measured higher in tensile stress, i. e., had a still stronger tendency to contract.

Fig. 10 shows the effect of solution temperature on stress. Again the deposits with the higher stress are preferred in practice, since we have found that deposition on plastic and wax molds must take place at temperatures below 130° F, production installations to date being operated at 115° to 120° F. Incidentally, the stress measurements shown in Figs. 9 and 10 follow patterns similar to those already reported by other authors. It should be mentioned that a deposit produced in an operating standard electrotyping solution of the composition shown in Table III and under conditions deemed to be most desirable for producing deposits in this solution was 17,400 psi.

It has been reported that operating conditions which tend to cause codeposition of a hydrate or oxide also tend to increase contractual stress[5]. It is interesting to note that many of the operating conditions necessary for satisfactory production of nickel electrotypes in this solution are those that would permit the deposition of a hydrate or an oxide.

Effect of Impurities and Their Removal

While we have not accumulated quantitative data on the effect of metallic and organic contaminants in the cobalt-nickel solution operated under the conditions described herein, we have found sufficient evidence to justify recommending continuous purification for producing consistent results with this solution. Fig. 11 is a photomicrograph of a nickel deposit, produced under conditions shown in Table II, with the exception that a low-purity nickel anode (90/92%) was used in the plating test. The effect of the impurities is the formation of laminations; the grain size appears to be substantially the same as that in Fig. 6, left.

Blum and Winkler[5] describe the effects of some impurities in the standard electrotyping solution; they are as might be expected and as have been demonstrated in Watts nickel and its variants. Organic contaminants, which can be introduced from tank linings, salts, water, etc., result many times in brittle deposits, pitting, porosity, etc. Many metallic contaminants are also troublesome, causing brittleness, pitting, roughness, etc.

Fig. 12 is a diagram of a continuous purification system that is a part of the plating tank. The troublesome organic and metallic contaminants can best be controlled by the use of a system of this or similar type. Continuous filtration through activated carbon and activated clay is used to remove the organic contaminants, and continuous electrolysis at low current density to remove metallic impurities. The current density employed at the cathode in the purification system should vary somewhat, as outlined by Case[6]. For general purposes we suggest that a current density of 5 asf be employed on a corrugated steel cathode. It is also recommended that the dummy-cathode area be of sufficient size to permit the passage of 0.05 ampere per gallon of solution per hour of operation.

In Fig. 12, note that sufficient space is left between the bottom of the baffle and the bottom of the tank to permit the air-agitation pipes in the plating compartment to extend into the purification system. Agitation is most helpful during purification and should be used at all times.

The amount of activated carbon and activated clay used in charging the filter can be varied somewhat, depending upon local conditions. For general purpose we suggest 1 pound of activated carbon and 1 pound of activated clay per 100 gallons of solution per 40 hours of operation.

Summary

1. Production experience has confirmed the laboratory data obtained with cobalt-nickel solutions, and there are in operation production solutions of the composition described in this paper that serve satisfactorily in the manufacture of nickel electrotypes.

2. The cobalt-nickel deposits are hard and at the same time more ductile than deposits now produced from the standard nickel-electrotyping solution.

3. The permissible current densities in the cobalt-nickel solutions are much higher than those now used in the standard electrotyping solution, without causing objectionable distortion of the nickel deposit that would render it unsuitable for electrotypes.

4. The cobalt-nickel solution is prepared from common chemicals, and simple analytical methods are available for the control of each constituent of the bath.

5. The cobalt-nickel solution can be continuously purified without interference with the plating operation.

6. It is difficult to correlate wrinkling of the nickel deposit of this application with the stress in the deposit.

Fig. 11. Photomicrograph of cobalt-nickel deposit produced according to Table II except that impurities were introduced into the bath and the deposit through the use of a 90/92 per cent nickel anode. 1000X

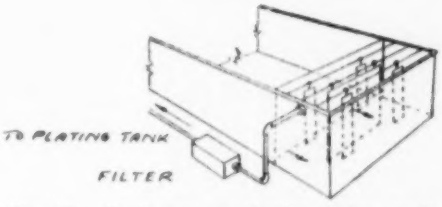

Fig. 12. Continuous purification system made part of the plating tank

Acknowledgments

Hardness measurements were made at Michigan State College by Dr. D. T. Ewing, under a fellowship sponsored by Hanson-Van Winkle-Munning Company.

The author is indebted to Pontiac Engraving and Electrotype Company of Chicago, which supplied the plastic molds for the plating tests, and to W. F. Hall Printing Company of Chicago for valuable data on press runs and suggestions based on experiences with operating solutions.

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A SURVEY OF LABOR COSTS IN CHICAGO JOB SHOPS

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Executive Secretary, Chicago Electroplaters' Institute, Chicago, Illinois

The Chicago Electroplaters' Institute, an organization of job shop operators, in March of this year completed a survey of labor costs in the Chicago area.

Hourly Base Rates

The information about hourly base rates was received from six shops with 336 organized employees and 28 shops with 598 unorganized workers. The data from the two groups were tabulated separately, but the differences between them were not very significant, in fact, the general averages were exactly the same. For this reason the two groups have been treated as one in the summary table presented here.

This table shows both the range and the average hourly wage for each classification. In practically all cases the median hourly rate, i. e., the hourly rate paid the worker who would place in the middle if all workers in a classification were lined up in order according to their hourly rate, was substantially the same as the average hourly rate in the same classification. (The difference between the two may best be shown by an example: if five men receive, respectively, 85 cents, 85 cents, 90 cents, $1.35 and $1.70, the median rate, for the third man, is 90 cents, but the average rate is $1.13.)

A similar survey in May, 1948 covered only Class "A" platers and polishers. The 223 platers and 174 polishers at that time received an average of 2 and 3 cents less per hour, respectively.

Piece Work Rates

Twelve of the 34 companies surveyed had some of their polishers on piece work. A total of 85 were on piece work at least part of the time and the average earnings reported were those earned at the time the survey information was sent to this office. Those 85 employees earned an average of $1.97 an hour when on piece work, or about 20 cents above the average base rate. By company, the rates ran from $1.70 to $2.50 per hour.

Weekly Hours of Work

During the three-month period that this information was collected information was received from 48 firms with 1,475 employees. The average number of hours worked by all employees was 41.7 per week. The chart shows the distribution by companies.

No. of Firms	*Hours per Week*	*No. of Firms*	*Hours per Week*
1	30	4	45
1	35	2	48
30	40	2	49
2	42	3	50
1	42½	1	55
1	44		

Number of Shop Employees

To insure that comparative figures be obtained, data from only 48 out of the 57 member firms are given here.

Month	*No. of Hourly Employees*
August, 1947	1,774
February, 1948	1,931
June, 1948	1,818
March, 1949	1,475

From February, 1948 to March, 1949 the number of shop employees decreased almost 24 per cent.

Wage Survey by Chicago Electroplaters' Institute Completed March, 1949

Classification	*No. of Employees*	*Hourly Base Rate, $ Range*	*Average*
Plater Leadman	23	1.25– 2.00	1.57
Plater "A"	160	0.95– 1.80	1.40
Plater's Helper	170	0.85– 1.50	1.13
Wire-Rack Leadman	9	1.15– 1.30	1.18
Wirer-Racker	166	<0.80– 1.20	0.97
Polisher—Buffer "A"	170	1.35–>2.00	1.76
Polisher—Buffer "B"	19	1.25– 1.60	1.42
Shipping Clerk	27	1.05– 2.00	1.31
Packer	39	0.85– 1.40	1.12
Hand Trucker	18	0.95– 1.30	1.16
Maintenance Man	47	1.05–>2.00	1.50
Maintenance Helper	7	1.05– 1.50	1.21
Degreaser	26	0.95– 1.50	1.18
General Factory Help	17	0.85– 1.30	1.23
Janitor–Watchman	28	<0.80– 1.20	0.91
Truck Driver	8	1.25– 1.70	1.46
Total	934	<0.80–>2.00	1.29

PLATING OF BRIGHT NICKEL AND DECORATIVE CHROMIUM WITHOUT RERACKING

ARTHUR W. LOGOZZO

President, Nutmeg Chrome Corporation, Hartford, Connecticut

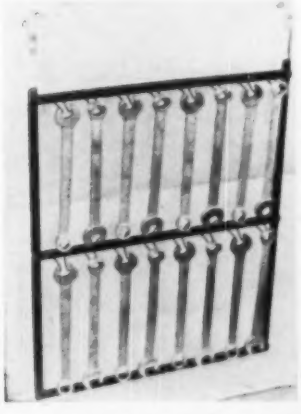
THE POSTWAR DEMAND by the consumer for bright chromium plated products has resulted in an unprecedented use of bright nickel by the plater. Not only does bright nickel make an excellent base for the subsequent chromium, but also provides fair corrosion protection. The bright nickel bath is now to the plater what the dull nickel bath was fifteen years ago.

Along with this change in type of nickel bath used new problems have arisen, including problems pertaining to racking and rack coatings, and the control of metallic impurities in bright nickel baths. These problems are the subject of this article.

Racking

Proper rack design is the key to production. It also provides the solution to current distribution problems and consequently makes it possible to obtain more uniform deposits. Racks should be of a standard size to enable one to balance work loads better and to equalize the current density. Fig. 1 illustrates how wrenches of two different sizes may be plated on racks with the same overall dimensions.

Simple rack construction is necessary from the standpoint of economy. The hairpin type of contact, which does not require soldering or brazing, will meet this requirement. In building a rack of this kind one should start with the standard frame, drill pairs of holes in the cross bars for the contact wires, and then, instead of fastening the wires into position by soldering or brazing, merely form hairpins slightly wider than the distance between opposite sides of each pair of drilled holes and push them into position. The spring tension in the phosphor-bronze wire will secure it into place; when the rack coating is put over it, the job becomes fool-proof.



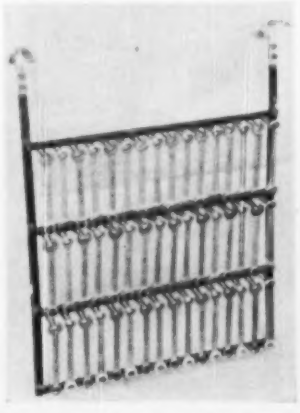


Fig. 1. Wrenches of two sizes plated on racks of identical overall dimensions

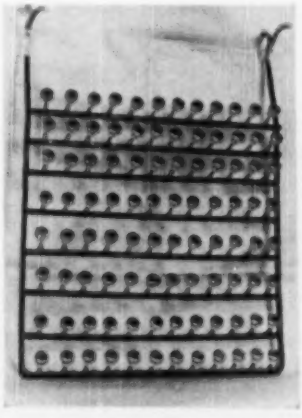
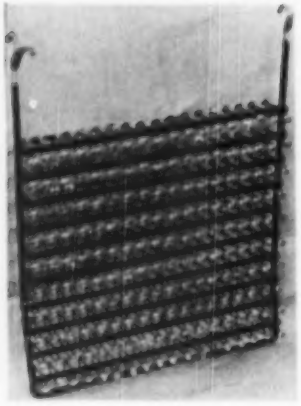


Fig. 2. Rack with hairpin contacts. Straight-line racking



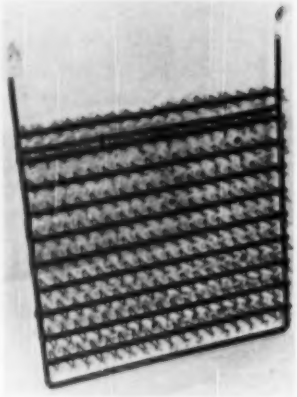


Fig. 3. Racks with hairpin contacts. Mass racking

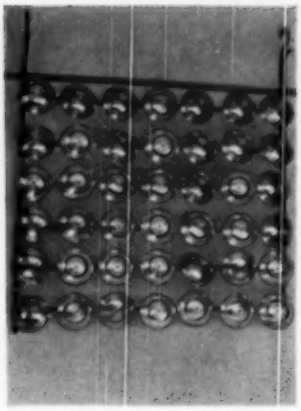


Fig. 4. Well-balanced rack for medium-size parts

Fig. 2 illustrates the use of the hairpin contact and also shows straight-line racking for good overall efficiency in bright nickel and chromium plating. In Fig. 3 are found racks holding a large number of small parts, 360 pieces per fixture. High production of small parts can be turned out with racks of this type. Fig. 4 shows a well balanced rack of medium-size parts for high production. Fig. 5 illustrates a simple rack featuring the hairpin contact for an article that has to be well rinsed between operations.

Fig. 6 shows a rack of decorative parts on which polythene tubes serve as stop-off, the solution level being kept half way up the tubes. Tubes are loose fitting for purpose of good rinsing. Fig. 7 illustrates how racks which are used through bright nickel and chromium may be fitted with conforming anodes when desired.

Rack Coating and Testing

The choice of material for rack coating is no longer a problem, plastisols being available in various and sundry colors from every supply house and rack builder. Some of these firms have developed better techniques than others in applying the coating, but the odds are definitely in favor of a good job.

The plater can insist on good, homogeneous coatings if he will purchase a high-frequency tester such as is used in testing organic linings in tanks. This tester will show any weak spot in the coating by establishing an arc contract with the metal base of the rack through the pores. If the plater will insist on the coating withstanding this simple test, he will get a better rack covering as well as force the supplier to do a better job. Some of the people engaged in

Fig. 5. Simple hairpin rack for part that requires particularly effective rinsing

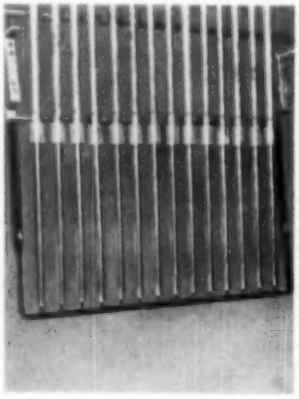


Fig. 6. Rack with polythene tubes serving as stop-off

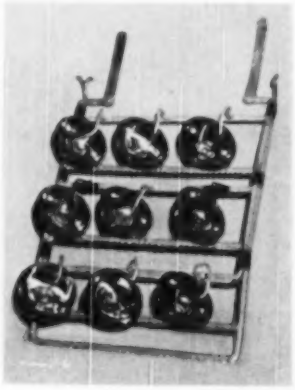


Fig. 7. Rack with conforming anodes for brightnickel-chromium plating

Fig. 8. Partial view of bright-nickel and decorative chromium department

developing plastisols have used these high-frequency testers for some time.

Cycle for Nickel and Chromium on Same Rack

The following is a standard cycle for bright nickel and chromium plating of steel parts. It can be utilized for plating brass merely by varying the cleaning.

1. Soak or cathodic alkaline cleaner
2. Anodic alkaline cleaner, 10–12 oz/gal
3. Cold rinse
4. Acid dip, 40 per cent muriatic acid by volume
5. Cold rinse
6. Copper plate
7. Cold rinse
8. Acid dip, 20 per cent muriatic acid byovlume

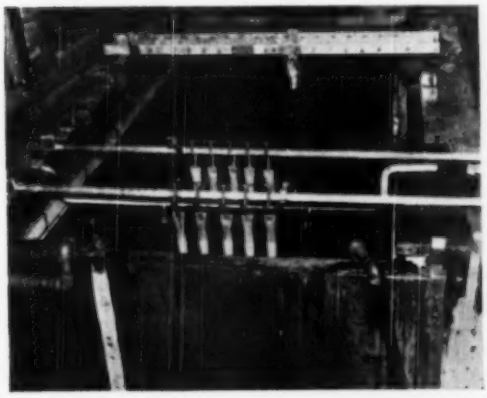


Fig. 9. Top of chromium plating tank with polythene chips

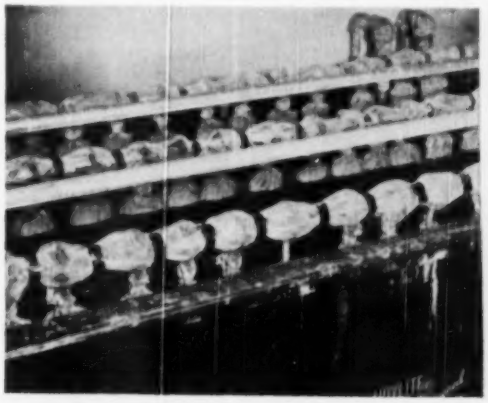


Fig. 10. Polythene sheeting used to wrap anode bars

9. Cold rinse
10. Bright nickel plate

TABLE I. SPECTROGRAPHIC ANALYSIS OF DEPOSIT ON DUMMY CATHODE

	Per Cent
Copper	0.36
Lead	0.55
Zinc	less than 0.10
Manganese	less than 0.01
Cadmium	less than 0.01
Silicon	0.19
Magnesium	less than 0.01
Boron	less than 0.50

TABLE II. SPECTROGRAPHIC ANALYSIS OF MATERIAL ON PADS FROM NICKEL FILTER

	Amount
Nickel	large
Boron	large
Iron	small
Magnesium	small
Copper	small
Silicon	trace
Tin	trace
Silver	trace
Aluminum	faint trace
Chromium	none
Lead	none
Zinc	none
Cadmium	none

TABLE III. SPECTROGRAPHIC ANALYSIS OF RESIDUE FROM SIDES OF NICKEL TANK

	Amount
Nickel	large
Boron	large
Iron	faint trace
Magnesium	small
Copper	small
Silicon	large
Tin	trace
Silver	none
Aluminum	none
Chromium	small
Lead	trace
Zinc	none
Cadmium	none

11. Cold rinse
12. Activating dip, 60 per cent muriatic acid by volume
13. Cold rinse
14. Chromium plate
15. Cold rinse
16. Alkaline neutralizing bath
17. Cold rinse
18. Hot rinse
19. Dryer

The principles behind this cycle, and the steps which comprise it, are as follows:

Step 1. A soak in either emulsion or alkaline cleaner is preferred on steel. Light cathodic cleaning is in order if the base metal is brass. Degreasing is oftentimes used in place of the above-mentioned treatments.

Step 2. Anodic alkaline cleaning in a 10 to 12 oz/gal solution designed for use on steel helps adhesion considerably. If the metal is brass, a light anodic treatment in 6 oz/gal brass cleaner aids adhesion.

Steps 3, 5, 7, 9, 11, 13, 15, 17. All rinses should be flowing at sufficient rate and time of immersion should be long enough that the operation be fully effective.

Step 4. Immersion in muriatic acid works well, but sulfuric acid or cyanide solution can also be used. On critical work it is wise to use a cathodic treatment in any of the three solutions.

Step 6. Copper plating, if required, fits in at this point, the thickness depending on specifications.

Step 8. The acid dip is used to acidify any carryover from the copper bath.

Step 12. Acid activation at this point leaves the nickel surface most receptive to chromium.

Step 15. This may be used as a dragout tank, in which case another rinse is required.

Step 16. Thorough rinsing in the alkaline neutralizing bath is helpful.

Chromium deposited on the contact wires is removed during the anodic alkaline treatment in Step 2 to dispense with the need for a separate stripping operation. No difficulties with hexavalent chromium contamination have been encountered, probably because the amount of dissolved chromium is small, the cleaner is changed regularly, and muriatic acid follows in the cycle. The stripping of nickel from the contact points can be done periodically by any of the usual methods without disturbing the rack coating.

A careful study of this cycle will reveal neutralizing conditions that make it almost impossible to get into contamination difficulties.

Passivity of Nickel

The passivity of nickel plate is probably the largest single cause of poor coverage by the subsequent chromium deposit. Two types of contamination cause poor coverage—the metallic and the non-metallic impurities found in the bright nickel bath. The worst troublemaker is contamination with copper, zinc, lead or iron. With any one or any combination of these impurities

(Continued on page 601)

Disposal of Plating Room Wastes

I. A CRITICAL REVIEW OF THE LITERATURE PERTAINING TO THE DISPOSAL OF WASTE CYANIDE SOLUTIONS

(Continued from the May, 1949 issue)

Treatment with Alkali

Eldridge, as reported by Hubbs[83b,c], treated a 200-ppm potassium cyanide solution with slight excess lime for the expressed purpose of rendering it slightly alkaline, and then aerated for about 20 hours. He does not state why he wanted the solution to be slightly alkaline nor why he used lime for the purpose. The clear liquor showed a trace of cyanide and when tested by Hubbs[83b,c] in 10:1 dilution was toxic to fish, though further aeration of the diluted solution rendered it nontoxic. It is likely that carbon dioxide in the air used for aeration was responsible for displacement of cyanide, in which case the addition of lime would be of dubious value unless it hastened the desired hydrolysis reaction. Golovin[161] obtained a patent in which wastes containing cyanides are rendered innocuous by treatment with milk of lime plus sodium hydroxide followed by aeration for 7 to 8 days at temperatures not below 3° C (5.4° F). Just why sodium hydroxide should be added is not known as it would seem to hinder rather than aid the desired reaction.

Cotton[68] stated that copper cyanide solutions boiled with milk of lime (calcium hydroxide) decompose into formates and ammonia leaving a residue of sodium formate, copper carbonate, calcium carbonate, etc. This process is stated by him to be used by Delco-Remy to dispose of pots of cyanide heat-treating salts which have gone bad. The salts are placed in a well-ventilated tank of hot water, heated by high-pressure steam, excess milk of lime is added, and the mixture boiled until evolution of ammonia ceases. The resulting sludge is carted to a dump.

Oxidation of Cyanide

Cyanides in basic solution are readily oxidized to cyanate by several oxidizing agents. The choice of oxidizing agent is a matter of cost, ease of use, and desirable or undesirable characteristics of effluent produced. Because cyanates are only about 1/1000 as toxic as cyanides, a waste containing 100 ppm cyanide would become practically nontoxic if the cyanide were all changed to cyanate. In neutral or acid solution cyanates decompose to carbon dioxide and ammonia. If sodium cyanate solution is boiled there is considerable conversion to carbonate. While the cyanates are not particularly poisonous, the tendency now on the part of pollution control authorities is to require destruction of the cyanates also.

Schulenburg and Beier[67], in 1941, obtained a patent covering the treatment of a metallic cyanide solution with an alkali followed by subsequent heating in the presence of an oxidizing agent for the express purpose of recovering the metallic content. It was noted that the cyanide would be oxidized to cyanate. Beier[67b,67bb,67bbb] obtained more general patents in 1943 which cover the treatment of waste cyanide solution with alkali and oxidizing agent to convert cyanide to cyanate followed by treatment with acid waste pickling liquor to decompose the cyanate to carbon dioxide and ammonia.

Use of Chlorine. The use of chlorine to treat cyanide wastes in basic solution is coming into wide use in the United States. Its success is due to the completeness of the reaction, the availability of chlorine, and the availability of suitable feeding equipment made possible by the wide use of chlorine for treating water supplies, and the availability of engineering "know-how" of engineering companies and consultants in the use of chlorination.

Chlorine added to a basic solution of cyanide rapidly oxidizes the cyanide to cyanate. Further addition of chlorine leads to decomposition of the cyanate to form, finally, carbon dioxide and proba-

a. e. s. research project no. 10

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TABLE II. SOME DAILY FIGURES FOR TREATMENT OF CYANIDE WASTES AT TALON, INC., MEADVILLE, PA., APRIL, 1947

Volume of waste treated gal	Volume of waste discharged gal	Cyanide content (ppm CN) basis of initial volume	Cyanide content (ppm CN) basis of discharge volume	Cyanide content (ppm CN) after adding Cl_2	Cyanide content (ppm CN) after adding CaO	pH before adding Cl_2	pH after adding Cl_2	pH after adding CaO	Amount of Cl_2 used lb	Amount of CaO used lb	Moles Cl_2 per mole CN	Moles CaO per mole CN
10,274	17,216	85.02	50.6	0.52	0.1	12.3	11.1	11.5	58.0	250	2.92	15.90
7,498	15,083	134.43	66.8	1.17	0.3	11.6	11.0	11.8	47.0	300	2.05	16.52
9,303	16,660	157.82	55.9	1.32	0.4	12.3	11.5	10.7	55.0	150	1.65	5.67
11,682	23,602	212.62	105.1	4.12	0.8	11.2	7.1	11.1	85.0	100	1.50	2.23
13,328	22,075	134.42	81.1	1.64	0.9	12.0	8.4	11.8	65.0	250	1.59	7.72
6,803	18,376	144.82	53.6	4.42	1.0	11.2	8.4	11.5	76.0	300	3.39	16.90
6,664	12,099	119.02	65.6	2.70	1.0	11.8	5.4	8.7	50.0	100	2.78	7.04
9,996	18,515	225.42	121.5	3.77	1.3	10.8	6.8	7.2	83.0	100	1.64	2.47
11,384	19,071	151.06	90.2	1.77	1.6	10.4	6.9	7.3	52.0	100	1.33	3.23
11,384	19,992	209.82	119.5	2.47	1.8	11.4	6.5	7.6	63.0	100	1.16	2.32
12,516	24,579	175.92	89.5	3.64	2.7	10.9	7.5	7.4	99.0	250	1.98	6.30
4,170	28,634	1117.32	162.5	4.84	3.8	11.4	9.5	10.5	228.0	750	2.16	8.95

The treatment consisted of applying chlorine in water solution over a period of several hours to the daily batch. Lime was then added for removal of copper, and the supernatant liquid dribbled at constant rate to the sewer. The residual chlorine content was 0.00 throughout.

bly nitrogen or nitrogen compounds. The process as industrially applied is rather fully discussed by Dobson[5b4,5b8] though no operating data are given. We have been advised that several continuous-flow plants using chlorine to treat cyanide plating wastes are currently being designed and that at least one continuous plant has been in successful operation for several months. (Cyanide treatment methods, including that of chlorination, are usually batch processes. This is found desirable since the concentrations of wastes fluctuate rather widely and an accumulated waste of averaged composition is simpler to treat.)

The reaction between chlorine and cyanides usually noted in chemical text and reference books leads to the production of cynogen chloride, a material quite as poisonous as hydrogen cyanide. This is the reaction which takes place in neutral or acid solution and is in fact a practical method of producing cynogen chloride. However, if the cyanide is in basic solution, cynogen chloride is not formed (at least in any detectable quantity) but oxidation to cyanate occurs instead. These reactions are rather thoroughly discussed in papers by Moir and Gray[4,7] and White[7b,12]; the oxidation to cyanate is presented in the discussion of these papers but has apparently been overlooked by most people. Eldridge[6], for instance, in 1933, dismissed the use of chlorine for treating cyanide wastes because he was not aware of the difference between the reactions in acid and basic solution. He was familiar with the paper by Moir and Gray mentioned above but apparently did not note the discussion of their paper by White regarding the oxidation of cyanide to cyanate in basic solution. Even H. E. Williams' 2nd ed. (1948) of "Cyanogen Compounds"[5,7b] describes only the cynogen chloride reaction*

Dobson[5b8] gave a rather complete discussion of the reactions involved and presented the equations:

$$NaCN + 2NaOH + Cl_2 = NaCNO + 2NaCl + HOH$$

and

$$2NaCNO + 4NaOH + 3Cl_2 = 2CO_2 + 6NaCl + N_2 + 2HOH$$

In actual practice more than the theoretical amount of chlorine is used and it is supposed that some nitrous oxide or higher nitrogen oxides may be formed. If the *p*H of the solution drops below 8.5, nitrogen trichloride is also formed. The reaction between cyanide and chlorine is exothermic: a solution containing 1000 ppm CN will have a temperature rise of 7.2° F under adiabatic conditions. If the solution temperature exceeds 120° F (a situation easily avoided), a substantial portion of the added chlorine will form chlorates and only a small amount will react with cyanide. It might be noted that the chlorination process is not feasible for wastes containing silver cyanide because, though the cyanide content is destroyed with chlorine, the silver is not precipitated but remains in solution and precipitation of silver is necessary for subsequent recovery operations.

Work performed in 1938[b] indicated that

*Since writing the preceding paragraph we have received letters from Mr. J. J. Williams of Talon, Inc., and Mr. J. G. Dobson of the Foxboro Company regarding the effect of *p*H on chlorination of cyanide solutions. Mr. Williams states that chlorination can be carried out successfully at *p*H as low as 3 without release of cyanogen chloride and that a low *p*H is in fact essential for complete removal of copper. We suspect that in the dilute solutions being treated by Talon, Inc., the cyanogen chloride remains in solution but is later destroyed by excess chlorine or addition of lime or both. Mr. Dobson points out that the solubility of cyanogen chloride is such that release from the usual waste offers no practical problem. He further states that at *p*H less than 8.5 nitrogen trichloride may be released and, while not particularly dangerous in the atmosphere, is very annoying to eyes and nasal passages. Formation of cyanogen chloride occurs at a much lower *p*H than 8.5 and this lower limit of 8.5 is chosen because of the nitrogen trichloride formation. To prevent this formation at points of local acid conditions Mr. Dobson recommends placing alkali in the actual chlorine injector or mixing line. He also notes that the formation of chloramines at lower *p*H increases the consumption of chlorine and that economics must govern the lime-chlorine ratio. It is thus clear that sufficient information is not available regarding the proper *p*H to use in chlorination of cyanide wastes.

the cyanide content of sodium zinc and sodium copper cyanide solutions could be reduced to substantially zero ppm by adding lime to the solution and then passing chlorine through the slurry. It was noted that cyanogen chloride may also be formed. Meisch[6] listed the alkaline-chlorine treatment of cyanide wastes as being feasible but gave no data. Krause[23] suggested the use of the alkaline-chlorine process where acid wastes are not available for acid treatment of cyanide wastes. He stated that any considerable excess of lime is to be avoided (presumably to prevent the formation of unnecessary sludge).

Laboratory work carried out in 1944[b] showed that lime sludge plus chlorine, or caustic soda plus chlorine, would successfully destroy cyanide. The ratio of chlorine to cyanide necessary for complete reaction of cyanide was found to increase with the initial cyanide content. The higher ratio is probably due to further reaction between the chlorine and the cyanate formed in the primary reaction. It was also found that copper was precipitated as bluish-green copper carbonate or black copper oxide depending upon operating conditions. Oeming[27b,c] states that 2–3 pounds of chlorine per pound of sodium cyanide in the presence of caustic soda and at a *p*H of not less than 11.5 reduces cyanide to less than 1.0 ppm. Dobson[28] states that 3.5–4 pounds of chlorine per pound of CN (equivalent to 2–2.3 pounds of chlorine per pound of NaCN) at *p*H 8.5 is satisfactory for oxidizing cyanide to cyanate. The formation of cyanate requires about 1 minute while the decomposition of cyanate requires about 1 hour.

Fried and Wiest[35] described a batch treatment plant with 20–30 minutes detention time for the chlorine treatment, which was put into successful operation by them for an aircraft factory, but no operating data are given nor any experimental data, although mention is made of laboratory and semiplant experimental work having been performed. Some chemical equations are given to explain the reactions but they are of a hypothetical nature and the basis for them is not presented.

Barnes[31] described a chlorination plant in successful operation for Talon, Inc. at Meadville, Pa. This is the only paper we know which presents actual operating data for the chlorination of cyanide plating wastes. The wastes were from copper plating, zinc plating, and cyanide heat treating. Apparently chlorine water is added to the waste and then lime to remove copper. A calculation of the ratio of chlorine to cyanide content, based upon the data presented in the author's Table III, leads to results not in agreement with the stoichiometric discussion in the body of the paper. For instance, he reported 28,634 gallons of 1117-ppm cyanide content being treated with 228 pounds of chlorine. If it is assumed that ppm cyanide means ppm CN, this represents 0.325 moles chlorine per mole CN (0.886 lb chlorine per lb CN) which is inadequate; if ppm cyanide refers to ppm NaCN, then the ratio is 0.598 moles chlorine per mole cyanide and is still well below the 1 mole theoretically required.

We had available a copy of the data upon which Barnes' Table III is based and found that the 28,634 gallons represent the volume of liquid discharged after treatment and that the initial wastes amounted to only 4,170 gallons, the increase during treatment presumably being caused by the bulk of chlorine water added. The initial concentration of cyanide based upon final volume would be 162.5 ppm cyanide in which case the chlorine added amounts to 2.16 moles per mole CN, which is a more reasonable figure. The minimum conditions reported by Barnes are 14,716 gallons (initially 8,469 gallons) of 134 ppm cyanide (99.8 ppm on adjusted basis) and this gives 1.79 moles chlorine per mole CN actually present. Barnes also reported "average" figures which are questionable since they are the sum of figures for each day's operation divided by the number of days and do not represent a truly average condition of operation. A representative selection of the original data is presented in Table II of this report.

Several comments of interest might be made concerning these data. There are appreciable variations, particularly in the final *p*H values and the ratios of chlorine and lime to cyanide. The final cyanide contents in several cases would still be toxic if disposed to a stream but would be satisfactory if disposed to a sewage plant, the latter procedure being in fact the one followed for the Talon plant. The low *p*H values maintained for many of the batches are well below the 8.5 *p*H mentioned by Dobson as being the minimum permissible. The maintenance of a high *p*H would seem to be more important than the exact ratio of chlorine to cyanide, though *p*H, chlorine-cyanide ratio, lime-cyanide ratio, and initial concentration of cyanide all seem to affect the residual cyanide content. We understand that the nature of the wastes at the Talon plant has changed in recent months and

TABLE III. RESULTS OF ALKALINE-CHLORINATION TREATMENT OF CYANIDE SOLUTIONS[31b,c]

Data	Type of Bath		
	High Speed Copper	"Durobrite" Zinc	Carburizing Salt
Volume treated, gal	7	7	7
Cyanide content, ppm CN			
Initial solution	26,600	26,600	13,300
Treated solution	<1	<1	<1
*p*H			
Initial solution	>13	>13	?
Treated solution	11.8	11.0	11.6
Amount Cl_2 used, lb	16	10	6.5
Amount NaOH used, lb	20	9	9
Moles chlorine per mole cyanide	3.78	2.36	3.07
Moles sodium hydroxide per mole cyanide	8.39	3.77	7.55
In treated solution			
NaCNO, ppm	none detected	1300	5000
NaCN, ppm	<1	<1	<1
Cu or Zn, ppm	1	5	
Available Cl_2, ppm	none	200	370
Dilution required to become nontoxic	200	143	143

that considerably different ratios of chlorine to cyanide are now used. Table II does not, therefore, represent current practice in this particular plant.

a. e. s. research

Washburn[139,140] carried out a laboratory investigation to determine the dilution ratios necessary to render various cyanide solutions nontoxic to fish both with and without treatment with sodium hydroxide plus chlorine. The fresh undiluted solutions required dilution ratios of about 100,000 to 1. The results after treatment are presented in Table III of this report. Three types of solution were used: "High-Speed" copper plating bath, "Durobrite" zinc plating bath, and carburizing salt bath, all as compounded by the du Pont Company.

Two objections can be made to Washburn's experimental work: (1) the residual chlorine in two of the baths is very high (between 200 and 400 ppm) and of itself may be toxic to fish as discussed elsewhere in this report; (2) several fish were used in a small amount of solution (from 3 to 5 fish in 3 liters of solution) with air bubbling through. As discussed before, bubbling of air through cyanide solutions aids the dissipation of the cyanide; but of more importance, the fish remove cyanide from the solution so that after a few hours the cyanide content of the solution will have been reduced, but not necessarily accumulated to the same extent in the bodies of the fish since cyanides are subject to changes within the bodies of living organisms. It would seem to us that fish experiments should be carried out under conditions of steady flow of solution of known constant concentration through a container holding the fish. Karsten[97] appears to be the only one who has used such a technique. If one were to consider Washburn's results valid, then the chlorine method of treatment would hardly be acceptable since dilution ratios of the order of 200:1 are rather high. However, it should be pointed out that the solutions used in his experiments were of much higher concentration than the usual waste solutions.

Toxicity of Chlorine. As indicated above, chlorine is about as toxic to fish as is cyanide. Ellis[122] stated that 0.5 ppm in soft water killed fish in 72 hours or more. Experiments carried out in Great Britain[155] on trout led to the conclusion that tap water with 0.2 ppm chlorine was negligibly toxic, with between 0.2 and 0.3 ppm was slightly toxic, and with above 0.3 ppm was highly toxic. Schaut[121] found that the toxicity of solutions containing less than 1 ppm NaCN was doubled when chlorine was also present. Helfer[68] gave 0.1 ppm chlorine as being toxic. It would thus appear that the effluent from a chlorine treatment process must contain no residual chlorine. Of course, it is likely in most streams that materials will be present to react with any free chlorine and thus quickly reduce its concentration. Chlorine in alkaline solution may be less toxic than in neutral or acid solution, but we have no data on this.

Recommended practice is to produce effluents from chlorine treatment containing no residual chlorine. To what extent this is consistently accomplished in practice we do not know. There is the ever-present human factor to be considered that an overdose may be deliberately administered by personnel operating the treatment process in the belief that this will insure a safe effluent. Where automatic equipment is used, it becomes a question of the limits of control possible and the chance of faulty control. It is, of course, possible to follow the chlorination with a dosage of bisulfite to remove any excess chlorine; this is practiced in at least one plant.

We have been told that, in some places, plants are required to add sufficient excess chlorine to decompose cyanates completely. It would seem better to make the cyanate solution slightly acid, which also results in decomposition of cyanates. Beier[47b,c,e] describes a process wherein alkali hydroxide or lime is added to adjust the *p*H value of the cyanide solutions and an oxidizing agent introduced; waste pickling liquors are then added to make the solution acid in order to decompose the cyanates formed in the oxidation process. Dobson[46] noted that cyanates may decompose in acid or neutral streams but that nothing is known about the rate of such a reaction.

At present the chlorine process appears to be quite acceptable to pollution control authorities, and the general public is so used to chlorine in the drinking supply and in solutions for household use that no question of public relations is raised.

Use of Hypochlorites. Hypochlorites and bleaching powder (an impure hypochlorite) are commonly employed as sources of chlorine and are therefore applicable for the oxidation of cyanide solutions. Their use was suggested by White[151a]. The patents of Schulenburg and Beier[93] and of Beier[47] as well as the papers of Meinck[80] and by Bezzubets and Vozhdaeva[155] all give the use of hypochlorites as being a feasible method but present no data. Dobson[46] stated that the use of hypochlorites to oxidize cyanides is satisfactory and presents some laboratory data obtained by du Pont investigators[b] on the use of bleaching powder and sodium hypochlorite. The use of bleaching powder produces more sludge (because of its calcium content) than does sodium hypochlorite, but the bleaching powder is the cheaper material.

Unpublished (other than partial publication by Dobson) experimental work carried out by workers of the du Pont Company[b] showed that hypochlorites destroy alkali cyanide with formation of cyanate and that cyanogen chloride is also formed if the sodium cyanide concentration exceeds 100 ppm, though the production of cyanogen chloride can be avoided by adding caustic soda node for node to the cyanide. Further experimental work substantiated these findings and, in general, gave the same type of results as obtained with chlorine. It would appear that considerable excess of hypochlorite must be used to bring about complete conversion to cyanate.* There were also indications that the presence of cyanate or ferricyanide retard the oxidation of cyanide. For this reason solution with high cyanide contents require a higher chlorine-cyanide ratio than low cyanide-content solutions.

Powell[79,b] reported that in an actual cyanide-disposal process in the mining industry potassium permanganate had been used but that chloride of lime (calcium hypochlorite) had replaced the permanganate because of cheapness. In this process a 5 per cent solution of chloride of lime was added to the waste sand containing cyanide and the resulting moisture from the sand contained less than 25 ppm cyanide (considered satisfactory in this case).

For a plant having only a small quantity of cyanide wastes the use of hypochlorite as a source of chlorine rather than the use of chlorine directly may be preferable since the process requires less special equipment. Excess of hypochlorite likely to be used under such conditions may be undesirable in a stream. Bleaching powder is much cheaper than pure hypochlorites but causes more sludge to be formed; for an installation of any large size, the use of chlorine would be preferable. Oeming[93] says that the use of bleaching powder is probably limited to small-scale work or for solutions containing less than 5 per cent sodium cyanide.

Krause[87] stated that since chlorine gas should not be allowed to escape into the open (it can be seen from Table I of this report that the toxic limit for chlorine in the atmosphere is 1 ppm as compared to 20 ppm for cyanide) it is better to use hypochlorites, chloride of lime, or similar substances. However, by proper design

*Dobson (by letter) has suggested that the required excess of hypochlorite was due to the high temperatures of the solutions which led to formation of chlorates.

and operation the escape of chlorine can be prevented.

Use of Permanganates. The use of alkaline permanganate to oxidize cyanide to cyanate is discussed at some length in papers by Moir and Gray[4,7] and White[7b,15] which contain experimental data and the probable reactions. The reactions were found to be slow but could be hastened by coagulants such as sodium chloride, magnesium sulfate, calcium salts, etc. Powell[7b,14] reported the use of potassium permanganate at one time for treating cyanide wastes from mining operations but added that the use of chloride of lime was found to be cheaper and satisfactory.

Eldridge[81] carried out laboratory experiments using potassium permanganate and pure potassium cyanide solutions and found that the theoretical amount of permanganate added to 5 gallons of 200-ppm KCN resulted in complete oxidation overnight with production of sludge equal to 1 per cent of the total volume. He assumed the following reaction to hold:

$$3KCN + 2KMnO_4 + 5HOH = 2Mn(OH)_4 + 2KOH + 3KOCN$$

Mulcahy[68] and Barnes[83] both listed permanganate oxidation of cyanide as being a satisfactory method but gave no data. Karsten[97] carried out some laboratory tests and concluded that permanganate treatment was not satisfactory under his conditions. There were indications that the excess permanganate used was in itself somewhat toxic. However, he considered the permanganate process as potentially a more satisfactory method of treatment than treatment with either acid or ferrous sulfate. It might be pointed out that Karsten was interested in developing a continuous method of treatment requiring rather short time of contact.

We know of no commercial treatment of cyanide electroplating wastes with permanganate. It is likely that chlorine would prove superior to permanganate in most cases.

Toxicity. Hubbs[92b,c] tested the permanganate-treated solutions prepared by Eldridge and found that the toxicity to fish was 1/100 that of the original solution. A 1:1 dilution of the treated solution made it nontoxic. The sludge produced was found to be toxic only in concentrations above 1000 ppm. Karsten[97] observed that fish poisoned by potassium permanganate-treated solutions did not recover when placed in nontoxic solution whereas when poisoned by acid or ferrous sulfate-treated solutions they did recover. Ellis[177] quotes Adams to the effect that 5 ppm $KMnO_4$ is toxic to fish.

Use of Peroxides and Ozonized Air. Patents obtained by Beier[47] and Schulenburg and Beier[43] suggest the use of hydrogen peroxide as an oxidizing agent for cyanide wastes that have been made alkaline with lime, but there is no evidence that such a process has actually been tried. Neuwirth[48] suggested the use of ozonized air. He pointed out that the reaction is somewhat slow but can be accelerated by the addition of iron salts as carriers of oxygen and that this can be accomplished by using iron ores for filling reaction towers. It is not clear whether the method had actually been used in practice or even tested in the laboratory.

In investigations by the du Pont Company[b] laboratory work was carried out in which sodium peroxide and sodium perborate (monohydrate) were used to treat sodium cyanide solutions with and without sodium cuprocyanide, sodium zinc cyanide or sodium ferrocyanide. Both materials are too expensive to compete with the hypochlorites or other methods of treatment. The sodium peroxide was found to be quite ineffective even with prolonged boiling (100 per cent excess for the oxidation to cyanate destroying only 20 per cent of the cyanide in a 9000-ppm solution in one test). Sodium perborate was found to reduce cyanide concentrations to very low values (varying from 10 ppm to less than 1 ppm). In addition to the disadvantages already mentioned, both peroxides and ozone can be explosive under certain conditions, and it would appear that the use of either material would introduce an unwarranted explosion hazard. These materials do not hold any promise under present conditions.

Use of Alkaline Picrates. White[7b,15] reported that at ordinary temperatures the reaction between potassium cyanide in 0.1 per cent solution and sodium picrate in 1 per cent solution is complete in about two hours. The reaction was given as:

$$3KCN + \underset{\text{(picric acid)}}{C_6H_3N_3O_7} + 2HOH = K_2CO_3 + NH_3 + \underset{\text{(potassium isopurpurate)}}{C_6H_4KN_5O_6}$$

The reaction requires a neutral or alkaline solution, excess of acidity due to the picric acid itself being sufficient to prevent reaction. The isopurpurates are stable in alkaline or weak acid solution but not in strong acid solution. He found that picric acid has no apparent action on sulfocyanide or ferrocyanide. This reaction would hardly prove of value and makes use of a material (picric acid) which in dry form is an explosive.

Use of Electrolytic Oxidation. Early interest in the electrolysis of cyanide solutions arose in connection with the processing of gold and silver ores where it was hoped that gold and silver could be plated out and cyanide simultaneously recovered from the cyanide milling solutions. While it was, of course, possible to plate out the metals, the cyanide was not recovered but was destroyed. It was also found difficult to get an electrode material which would give a reasonable life.

In an unpublished memo[b] it has been stated that four methods are available for electrolytically destroying cyanide solutions:

(a) d.c. current with steel anodes when solution contains 0.5 to 1.0 per cent nickel as soluble nickel salt,
(b) d.c. current with graphite anodes,
(c) a.c. current with iron electrodes,
(d) a.c. current with iron electrodes plus d.c. current with graphite anodes, both circuits being in the same solution,

and that method (d) probably has the best possibilities. No information was given as to the basis for the listing.

Liebknecht[84] patented a process whereby alkali cyanates are produced by the electrolysis of a concentrated alkaline solution containing cyanides in high concentration using anodes of either platinum or copper with iron cathodes. Cotton[69] stated that copper cyanide plating solutions can be electrolyzed with 15-volt potential and insoluble anodes in hot aqueous solution; copper is plated on the cathode and cyanide can be reduced to less than 1 ppm. Hauri[94] described an instance where 1,000 gallons of plating solution containing 10 oz/gal (74,400 ppm) cyanide was disposed of by electrolyzing to 0.5 oz/gal which was further reduced by the lime-sulfur process.

Kern[95,18], interested in electrolysis of ore processing solutions, made a general review of the literature bearing on the subject and found that iron anodes dissolve in cyanide electrolytes by reaction with cyanide to form iron compounds which precipitate, that carbon and graphite anodes do not decompose under certain conditions, and that peroxidized lead and fused iron oxide anodes are reasonably permanent. He then carried out some experiments in the laboratory and concluded:

1. The electrolysis of cyanide solutions by direct current using insoluble anodes results in oxidation of cyanide to oxycyanide compounds (cyanates).

2. Anodes of metallic iron, nickel, and lead are dissolved as hydroxides and as cyanides. The lower the current density, the greater is the relative loss of cyanide. Consumption of cyanide is less with the lead anodes.

3. Use of peroxidized lead and passive iron anodes results in much less loss of cyanide.

4. The cyanide consumption during electrolysis of cyanide solutions is greater when the current density at the cathode is run higher than at the anode, which suggests that the loss of cyanide is the result of oxidation.

5. With solutions containing sulfocyanides or ferrocyanides, the cyanide consumption is much less.

6. Increased alkalinity of cyanide solutions reduces the cyanide consumption during electrolysis because of the increased conductivity of the solution. (It was pointed out in the discussion of the paper that the lower anode potential required by the more alkaline solution would neither discharge CN^- nor oxidize CN^- to CNO^-). Clevenger remarked in the subsequent discussion of the paper that: "It is an extremely dangerous thing to form conclusions regarding life of anodes from small scale experiments and particularly small scale experiments which cover a limited period of time. Anodes which appear entirely unaffected (in plant use) for the first few weeks often fail suddenly later."

Clevenger and Hall[16] studied, on a laboratory scale, the use of Acheson graphite as electrodes in the electrolysis of potassium cyanide solutions with and without potassium hydroxide or calcium hydroxide. They concluded:

1. Oxidation of cyanide is due principally to oxygen liberated at the anode through the decomposition of water.

2. Principal final reaction in solutions containing protective alkalinity is the formation of the corresponding alkali carbonate.

They also present equations for possible reactions taking place. In the discussion which followed, exception was taken to some of these reactions; it appeared that Clevenger had copied them from various sources and no test of their validity was available.

It might be concluded that electrode cost would be important in any method of destroying cyanide by electrolysis and that the *p*H of the solution would be an important factor. Since cyanide electroplating solutions are usually quite basic, acid would probably have to be added before disposal to a stream and would constitute an additional expense.

Since this section was written, two papers have appeared [R. W. Oyler, "Disposal of Waste Cyanides by Electrolytic Oxidation", Plating **36**, 341-342 (1949); L. B. Sperry and M. R. Caldwell, "Destruction of Cyanide Copper Solutions by Hot Electrolysis", Plating **36**, 343-347, 412 (1949)] which report laboratory and plant results on the use of electrolytic oxidation for disposal of concentrated cyanide wastes. As both these papers pertain directly to the problem under discussion, they deserve more than passing mention; the second paper is of particular importance because it presents more detailed information than is often encountered in publications concerned with waste treatment processes.

The first paper describes an installation at the Guide Lamp Division of General Motors Corporation in Anderson, Ind. The waste consists mainly of the plate-in entrained in the precipitate when a cyanide copper bath is treated with barium hydroxide to remove carbonate. After the sludge has been washed to remove the entrained solution, the latter is electrolyzed at 200° F with copper electrodes. Presumably the reactions are deposition of the copper at the cathode and oxidation of cyanide ion to cyanate at the anode. Undoubtedly further reaction takes place with the cyanate to yield such compounds as carbon dioxide, ammonia, and formates.

Very little quantitative data on the operations are given, and it is not clear to what extent the method is actually practiced. The total cost of the equipment is $4,460, but this does not include the electrolysis tanks which were already available. It is not stated how much solution can be treated in any given period of time, but an approximate idea of the size of the operation is obtained from the fact that two tanks, one of 1800-gallon and the other of 1200-gallon capacity, are used. No data on operating cost are given. The average rate of cyanide destruction is stated to be 1 oz/gal-day. As a typical example, a solution containing about 7 oz/gal of copper cyanide was reduced to about 0.3 oz/gal in 5 hours.

The second paper is concerned with experiments on the disposal of cyanide copper baths that can no longer be used for one reason or another. A laboratory investigation was made to study the effects of current density, temperature, and method of agitation. Data are given on the CN^- and Cu^{++} concentrations before and after electrolysis and on the concentrations of CNO^-, HCO_3^- and $CO_3^=$ after electrolysis. The final solution contains enough cyanate to be toxic and it is advisable to destroy it by sulfuric acid and boiling.

Results of a plant test on 700 gallons of solution using carbon-steel electrodes of 72 sq ft. area are tabulated. The voltage was maintained at about 6, the amperage varied from 1000 to 2800 and the temperature from 155 to 195° F. The initial total CN^- and Cu^{++} concentrations of 2.83 and 2.16 oz/gal respectively were reduced to zero (limits of sensitivity of analytical methods not given) by the end of 35 hours. The cost of operation for this one batch including destruction of cyanate but not including any cost for electrodes is given as $32.26. The anodes were considerably attacked and it is recognized that stainless steel anodes would be much more permanent.

We might conclude from these papers that the use of electrolytic oxidation is satisfactory for certain types of concentrated plating wastes though there is not sufficient information to compare costs with other methods of treatment; it would also appear that the electrolytic treatment requires considerable time and in many circumstances would have to be followed by some other treatment to reduce the cyanide to an acceptable residual concentration.

No definite figures on residual concentrations are given in these papers, but from some of the data given and from knowledge of the analytical methods used it would appear that they were of the order of 100 ppm or higher. Concentrations as high as this were apparently satisfactory for discharge to the sewage system of the localities in question (Anderson, Ind., and Grand Rapids, Mich.).

While Oyler reports that the dilute wastes produced from plating operations at his particular plant can be disposed of by simple dilution, this would not be a generally acceptable method of treatment and some additional method would have to be installed. It would seem better to use one method for all wastes, and electrolytic oxidation would seem to be too slow and too costly for dilute wastes. Even so there may be some situations where a plater may find it preferable to segregate concentrated from dilute wastes and treat them in different ways. Certainly, if in a plant it is possible to destroy a concentrated waste in the plating tank by a simple change in operating variables without upsetting manufacturing schedules and at a lower cost per pound of cyanide destroyed than by the method used for the dilute wastes, it would be desirable to do so and dump the tank as a dilute rather than a concentrated waste.

Other advantages of this method are the fact that no sludge is produced, that metals may be recovered, and that the plater has a method with which he is thoroughly familiar and can readily operate without outside help.

Formation of Thiocyanates

In a study of methods for removal of cyanides from mine residues to be pumped underground, Moir and Gray[4] noted that the addition of ammonium polysulfide to cyanide solutions would completely destroy the cyanide content but presented no data. They also noted[2] that a solution of ferric thiocyanate would undergo hydrolysis on long standing and release hydrogen cyanide. White[7b,b] stated, "I find that a 0.10 per cent solution of potassium cyanide is very slowly changed in the cold to potassium thiocyanate by excess of thiosulfate, though the reaction is not a commercially possible one as a 1 per cent conversion takes about a week. On boiling the mixture for about two hours the potassium cyanide is completely 'converted' in accordance with the following reaction:

$KCN + Na_2S_2O_3 = KCNS + Na_2SO_3$"

In a patent granted Hansen[92] it is stated that gases containing cyanide and ammonia will react with an aqueous suspension of sulfur to form ammonium thiocyanate so long as the temperature is not much higher than 30° C (86° F). Ammonium sulfide and bisulfide are supposed to be intermediate products. At temperatures above 30° C the bisulfide forms with difficulty and the formation of thiocyanate does not occur at a practicable rate since monosulfide is supposed not to form thiocyanate. It is noted, for instance, that at 50–60° C (122–140° F) not more than 20–30 per cent of the cyanide will be converted to thiocyanate in a gaseous mixture containing one gram (as HCN) cyanogen compounds per cubic meter. The patent covers a process whereby sufficient sulfur and ammonia are added to the treating solution to assure the formation of polysulfides, the inventor having found that sulfur will react with ammonium bisulfide even at temperatures as high as 60–70° C (140–158° F) with sufficient rapidity to convert completely cyanides to thiocyanates. If enough sulfur is present to maintain bisulfide and higher polysulfides and prevent their degradation to monosulfide, then the inventor reasons that temperature will no longer be a critical factor.

Whether this explanation is correct we do not know. It seems to emphasize rate unduly and ignore equilibrium factors, and there is reason to believe, based upon the experience of other workers with the conversion of cyanide in liquid solution to thiocyanate, that at higher temperatures the rate of reaction increases but the equilibrium becomes unfavorable. It may be that excess sulfur aids the formation of thiocyanate because of the usual effect of excess reactant on product concentration in cases of reversible reactions.

Klempt[93] was granted a patent for the treatment of gases containing oxygen, hydrogen cyanide, hydrogen sulfide, and ammonia with a solution containing suspended nickel sulfide or a nickel salt which will react with ammonia and hydrogen sulfide to precipitate nickel sulfide. The nickel sulfide reacts with oxygen to form free sulfur and nickel hydroxide and the nickel hydroxide reacts with hydrogen sulfide to form nickel sulfide. A cyclic process is thus set up to liberate sulfur from hydrogen sulfide, the sulfur reacting with ammonia to form ammonium polysulfide and the polysulfide reacting with hydrogen cyanide to form thiocyanate. The proper amount of nickel to use depends upon the amount of oxygen in the gas. If too much nickel is present, the excess ammonium polysulfide formed will react to form ammonium thiosulfate which will contaminate the thiocyanate product desired. If too little nickel is used, not enough polysulfide will form to react with all the hydrogen cyanide. Under certain conditions a nickel cyanide complex may form which undergoes no further reaction but the addition of sulfur to the solution will reduce it to nickel sulfide. Some data are given on operations on a pilot plant scale which indicate removal of 95–100 per cent of the hydrogen cyanide from a gas containing 1 g HCN, 10.5 g H_2S, 6 g NH_3, 2 g CO_2, and 1 g O_2 per cubic meter.

Wernlund and Zunick[103] were granted a patent covering the use of elemental sulfur and all types of polysulfides for treatment of cyanide solutions to form thiocyanate. It is stated in the patent that all metal cyanides can be converted into thiocyanates or thiocyanates and an insoluble heavy-metal compound by this method of treatment but that ferrocyanides are unaffected. Specific methods of treatment described are: (1) heating, at temperatures of 80° C or higher (preferably boiling), waste cyanide solutions to which 5–10 per cent excess elemental sulfur has been added in the presence of sufficient lime or other base to keep the solutions alkaline, the treatment requiring about one and one-half hours at the boiling point; (2) boiling waste cyanide solution with slight excess of lime-sulfur for 3–5 minutes; and (3) treating waste solution with lime-sulfur at room temperature, about two hours being required. Several experiments are cited which show initial concentrations of 20–1000 ppm cyanide (as NaCN) in various types of solutions to be reduced to 0.1–4 ppm cyanide by various modifications of the treatment procedure.

The suggestion has been made that these results are in error due to the analytical procedure followed and this is borne out in work reported by Dobson[96] but performed by other investigators working for the du Pont Company (as did Wernlund and Zunick)[b]. In these later experiments, lime-sulfur (70 per cent calcium polysulfide, 5 per cent calcium thiosulfate, 5 per cent free sulfur) was added to cyanide solutions and heated close to the boiling point. It was found that treatment of solutions of either simple sodium cyanide or High-Speed Copper Plating Salt failed to convert sufficient cyanide to thiocyanate to make the process feasible.

Oeming[97][c] stated that the addition of 1.84 pounds of lime-sulfur per pound of sodium cyanide with subsequent reaction at room temperature for 2 hours followed by ponding is a satisfactory disposal method for waste cyanide solutions. In view of the aforementioned results reported in the literature it would appear that rather lengthy ponding time would be required. Mulcahy[100], Barnes[101], Wise[105], and Cotton[94] all say that treatment of cyanide solutions with lime-sulfur is satisfactory.

Mr. L. F. Oeming of the Michigan Stream Control Commission advises (by letter) that the lime-sulfur treatment of cyanide wastes was studied at the Institute for Fisheries Research at Ann Arbor and that the results obtained indicated that the CN radical could not be reduced much below 100 ppm by this method of treatment.

Neel[101] told of an instance where plans to construct a treatment plant utilizing sodium acid sulfite (sodium bisulfite) to convert cyanides to thiocyanates were abandoned when it was found that cyanide could not be reduced below 20–30 ppm by this method. Barnes[101] used sodium acid sulfite for a while in a treatment plant but found it impossible to reduce cyanide to less than 25 ppm. While these two papers state that sodium bisulfite reacts with cyanides to form thiocyanates, no equations are presented and we have been unable to locate any other reference to such a reaction.

Even if conversion of cyanide to thiocyanates were complete, and it may be that conditions could be found under which the reaction would be complete, its use would be questionable because any subsequent contact of the thiocyanate with acid would release hydrogen sulfide and contact with chlorine or other oxidizing agent would release hydrogen cyanide. The thiocyanates are sufficiently nontoxic that in concentrations equivalent to the cyanide content of any usual wastes (say less than 500 ppm) they could be admitted to a stream without deleterious effect. However, if water from the stream were given chlorine treatment for purposes of water supply, the thiocyanate content would increase the chlorine demand. This would also be the case for sewage treatment works using chlorine treatment. During the past war a proposal was made that sewage effluents of the City of Coventry (England) emptying into the River Avon be treated with chlorine[102]. In the sewage were thiocyanates from gas liquor and it was found by laboratory tests that treatment with chlorine made a nontoxic sewage become toxic, though if sufficient chlorine had been added the toxic cyanides formed would probably have been oxidized. These tests were confirmed by working with simple thiocyanate solutions.

From this discussion it is evident that the conversion of cyanide to thiocyanate is not a feasible process except under the unlikely conditions where acid and oxidizing conditions would not be subsequently encountered.

Toxicity of Polysulfides and Thiocyanates. Brun[104] reported that test fish were unaffected after 10 days in a 0.001-N (81-ppm NaSCN) solution of sodium

(Continued on page 664)

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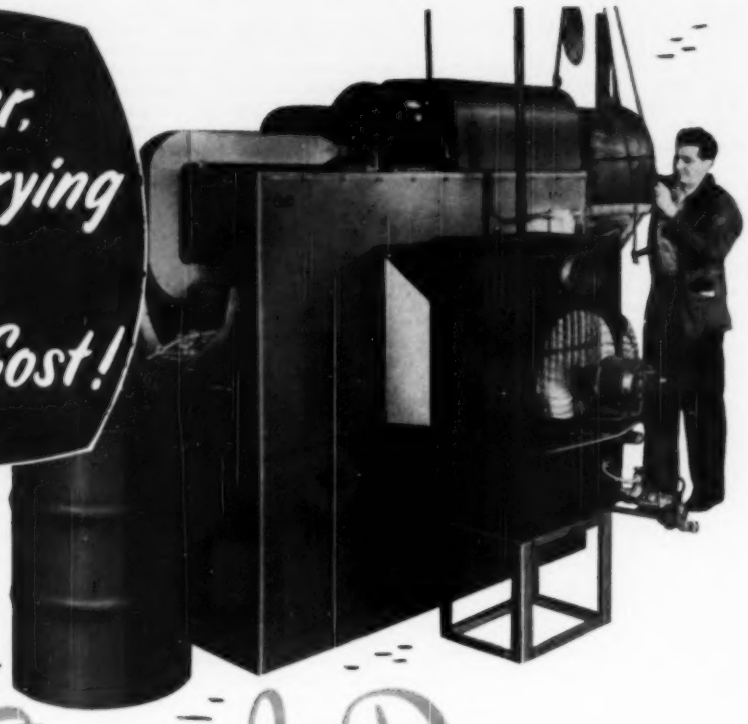

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A. The first requisite is to obtain the correct brass. If the grain size is too large, the resulting etch will be coarse; if it is not uniform, there will be local attack by the etchant, resulting in a non-uniform etch and what is known as "tails", i. e., streaks from the large grains. The sheet brass must also have a uniform temper and be free from cold-work strains. For the best results the size of the grain should be not more than 0.035 mm.

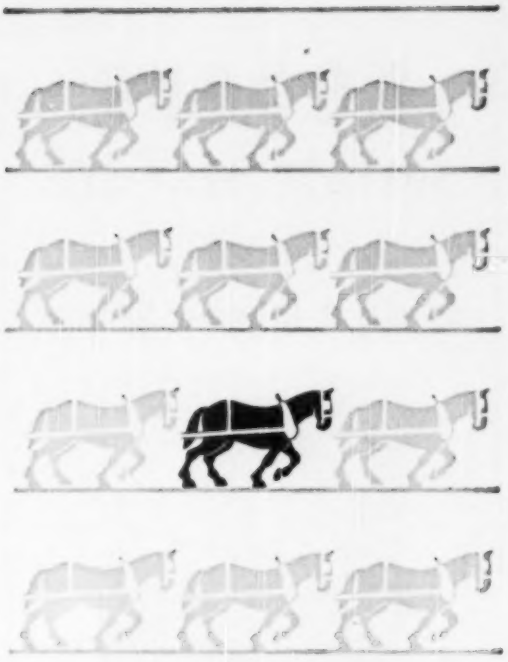
The dial is cut to size and preferably sand buffed to an even surface. The surface must be level if a uniform depth of etching is to be had for the fine scale and figures. The back of the dial is coated with a suitable asphaltum resist. The front is cleaned thoroughly and etched in a chloride of iron solution. (The prepared etching solution can be purchased from a chemical house.) The time of etching depends upon the depth of etch desired and the strength of the etchant. The dial is removed from the etching liquid, rinsed well, and dried well.

A glue-bichromate-albumen resist is applied. The formula is generally found on large bottles (1 pound or over) of Le Page's fish glue or it can be obtained from the manufacturer of the glue. The glue resist is applied in a photographic dark room for best results. The dial is whirled on a suitable contrivance, so that the film of resist will be as uniform as possible.

The design has been made in a black and white drawing and photographed. For the best results the wet method of obtaining the photographic film is used. The design is photographed onto the glue resist using sunlight or a Nernst lamp. The part affected by light will harden and form the resist for the future etching of the design in the dial. After exposure, the dial is hung in cold water, in which the resist not affected by the light will swell and can be easily removed. Sometimes a water soluble aniline dye is added to the water which gives a color to the remaining resist.

The film is baked at a low temperature to dry it thoroughly and to give more hardness to the resist.

(Continued on page 628)



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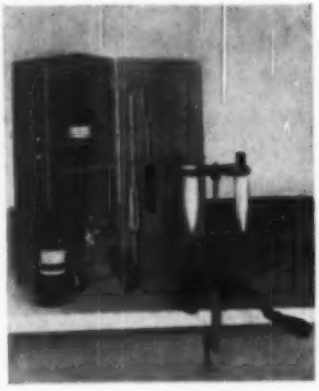

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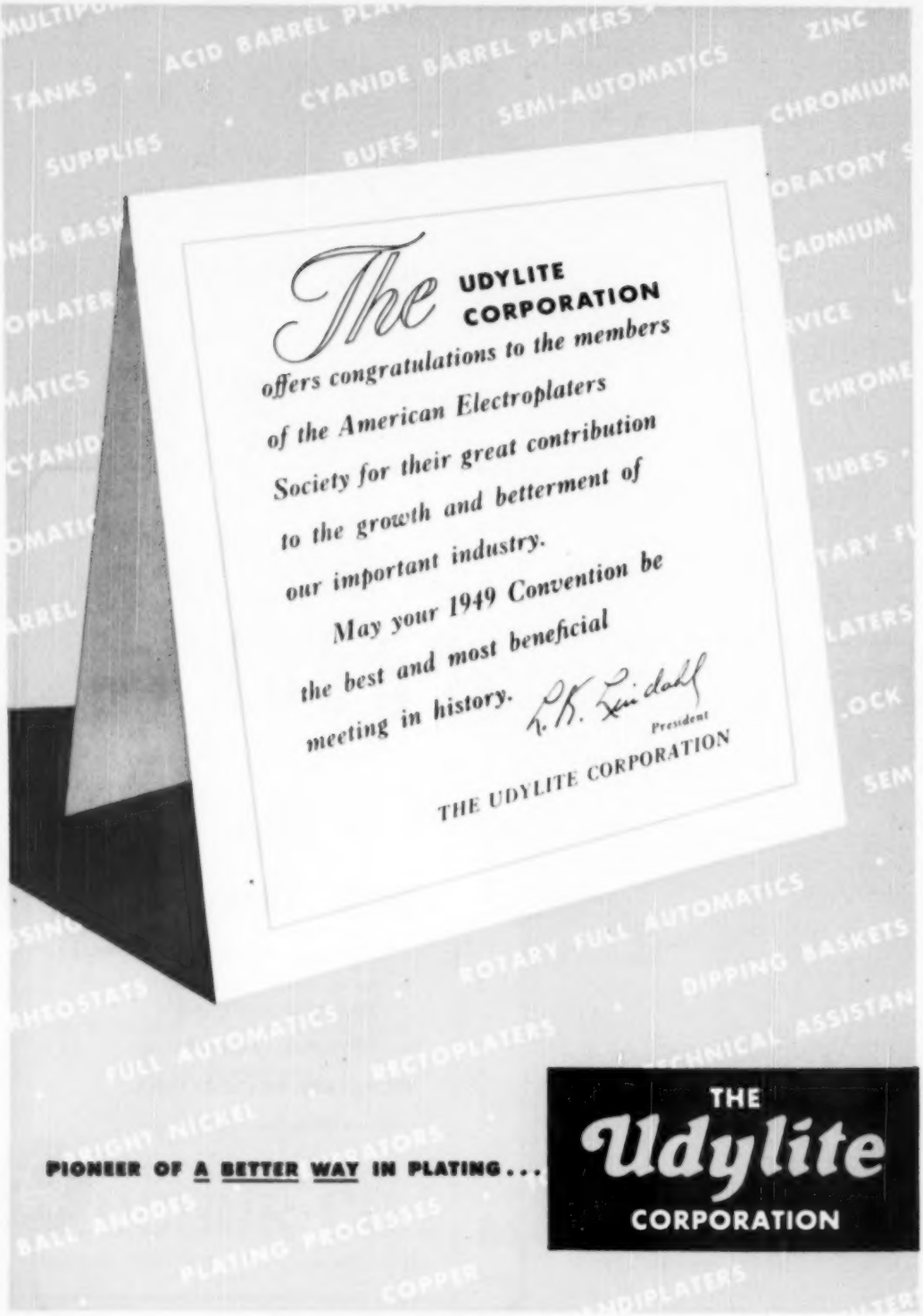
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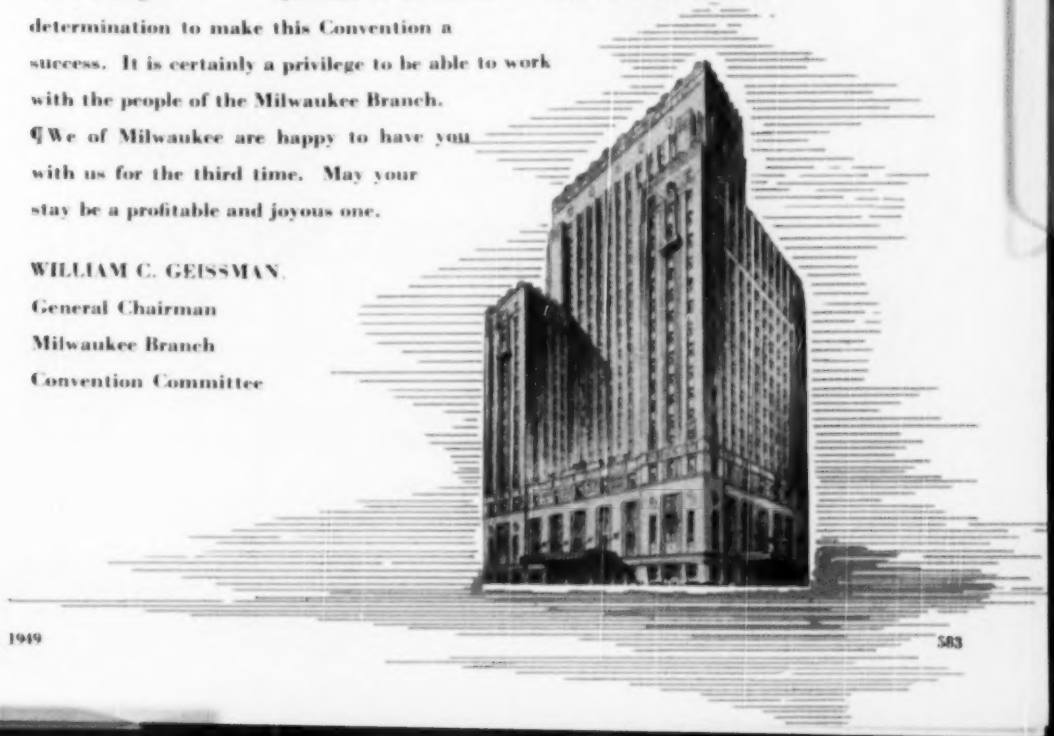
At the opening of the 36th Annual Convention of the American Electrop'aters' Society, the Milwaukee Branch will step into the very exacting role of attempting to outdo a superlative performance. I refer to the great Convention which was held in Milwaukee in 1938. Those who were fortunate enough to be here then will agree that it was a memorable occasion. Happily there are enough of the old timers left to guide those of the younger generation, and so all of us will be ready to entertain you again in the manner to which you have been accustomed. You will assure yourself of this by studying your program. ¶The committee has worked hard to supply all of the requisites for your enjoyment; its realization will be up to you. The educational program should be excellent since under the new Constitution the Editorial Board and our Educational Program Committee have cooperated to make this part of the Convention outstanding. ¶I want to thank all who have labored with the determination to make this Convention a success. It is certainly a privilege to be able to work with the people of the Milwaukee Branch. ¶We of Milwaukee are happy to have you with us for the third time. May your stay be a profitable and joyous one.

WILLIAM C. GEISSMAN,
General Chairman
Milwaukee Branch
Convention Committee



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GENERAL PROGRAM

Central Standard Time Used Throughout

Abstracts of papers listed below are found on pages 591-594

SUNDAY, JUNE 26, 1949

4:00 P. M.

REGISTRATION, Foyer, 4th Floor, Hotel Schroeder.

The Registration Fee of $10.00 entitles registrant to a book of tickets which can be used for admission to certain Convention functions and activities as listed in this program.

MONDAY, JUNE 27, 1949

8:00 A. M.

REGISTRATION, Foyer 4th Floor, Hotel Schroeder.

9:30 A. M. to 12:00 Noon

OPENING SESSION, Crystal Ball Room, Hotel Schroeder.

Invocation by the Reverend Frank C. Mesle, Member of the Rochester Branch, A. E. S. President, 1927.

Welcome to Delegates, Members and Guests by William C. Geissman, General Convention Chairman, Milwaukee Branch President, 1945-1947.

Welcome to Milwaukee by the Mayor.

Greetings from Milwaukee Branch by T. D. Hartshorn, Milwaukee Branch President.

First Business Session. Samuel S. Johnston, A. E. S. President, presiding.

12:00 Noon

EDUCATIONAL COMMITTEE LUNCHEON, Parlor F, 4th Floor, Hotel Schroeder.

12:15 P. M.

INTERNATIONAL FELLOWSHIP CLUB'S 25TH ANNUAL LUNCHEON. For suppliers and their representatives only. Empire Room, Hotel Schroeder.

8:30 P. M. to 1:00 A. M.

OPEN HOUSE, Crystal Ball Room, Hotel Schroeder, under the auspices of the International Fellowship Club.

Music — Dancing — Buffet served at 10:00 P. M.

A ticket to this event is included in the pass book furnished to each registrant.

2:00 P. M. to 4:30 P. M.

FIRST EDUCATIONAL SESSION, Crystal Ball Room, Hotel Schroeder. Admission by registration badge only.

A Symposium on the *Business of Plating*

Chairman: Mr. Walter L. Pinner, Director of Research, Houdaille-Hershey Corporation, Detroit

1. *"The Customer Looks at Plated Products"*, by Thor H. Westby and Robert E. Parkinson, Merchandise Testing and Development Laboratory, Sears, Roebuck and Company, Chicago
2. *"Process Control in Electroplating"*, by R. E. Harr, Western Electric Company, Chicago
3. *"The Job Plating Business"*, by Raymond M. Shock, Executive Secretary, National Association of Metal Finishers, Inc., Detroit
4. *"Availability of Plating Materials"*.

Short presentations of the outlook on availability of

"Alkalies, Including Silicates and Phosphates" by J. J. Duffy, Jr., Manager of Sales, Special Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia

"Cadmium" by L. K. Lindahl, President, The Udylite Corporation, Detroit

"Chromic Acid and Chromates" by Henry Mahlstedt, Manager, Plating Division, United Chromium, Inc., New York City

"Cyanides" by Ed McGovern, Manager, Sodium Products Division, E. I. du Pont de Nemours & Company, Wilmington, Del.

"Lead" by Charles R. Ince, Manager, Metal Sales Department, St. Joseph Lead Company, New York City

"Nickel" by Clarence H. Sample, Nickel Sales Department, The International Nickel Company, New York City

"Tin" by Dr. B. W. Gonser, Manager, Tin Research Institute, Inc., Columbus, Ohio

"Zinc" by Ralph F. Burns, Metal Division, The New Jersey Zinc Sales Company, Chicago

TUESDAY, JUNE 28, 1949

7:45 A. M.

EDUCATIONAL COMMITTEE BREAKFAST, Parlor G, 4th Floor, Hotel Schroeder.

8.00 A. M.

REGISTRATION, Foyer, 4th Floor, Hotel Schroeder.

9:00 A. M. to 11:30 A. M.

SECOND EDUCATIONAL SESSION, Crystal Ball Room, Hotel Schroeder. Admission by registration badge only.

A Symposium on *Copper, Nickel and Chromium Plating*

Chairman: Mr. Frank K. Savage, Star Silver Plating Co, Kalamazoo, Mich.

1. *"PR Cyanide Copper Plating"* by George W. Jernstedt, Manager of Electroplating Projects, Westinghouse Electric Corporation, E. Pittsburgh, Pa.
2. *"Electrodeposition of Nickel at High Current Densities"* by W. A. Wesley, Assistant Director, and W. W. Sellors and E. J. Roehl*, Chemists, Research Laboratory, The International Nickel Company, Bayonne, N. J.
3. *"Factors That Influence Operating Characteristics of Chromium Baths"* by J. B. Winters, Research Chemist, and R. O. Hull, President, R. O. Hull & Company, Cleveland
4. *"Scratch Hardness and Abrasion Hardness of Electrodeposited Chromium"* by J. M. Hosdowich, Chief Chemist, United Chromium, Inc., New York City

9:30 A. M.

NATIONAL ASSOCIATION OF METAL FINISHERS. Meeting of Board of Di-

*Now Manager of Technical Development, The Thomas Steel Company, Warren, Ohio

rectors, Parlor E, 4th Floor, Hotel Schroeder.

12:00 Noon

National Association of Metal Finishers. Board of Directors Luncheon. Club Rooms, 3rd Floor, Hotel Schroeder.

Educational Committee Luncheon. Parlor G, 4th Floor, Hotel Schroeder.

2:00 P. M. to 4:30 P. M.

Third Educational Session, Crystal Ball Room, Hotel Schroeder. Admission by registration badge only.

Round Table Discussion on *Acid Dips in Cleaning Cycles* and other subjects

Chairman: Dr. William Blum, Assistant Chief, Chemistry Division, National Bureau of Standards, Washington, D. C.

Short introductions of main subject:

1. "*Acid Dips for Ferrous Metals*" by Ivan C. Hepfer, President, Furniture City Plating Company, Grand Rapids, Mich.
2. "*Prevention of Embrittlement of High-carbon Steel*", by Dr. Richard M. Wick, Bethlehem Steel Company, Bethlehem, Pa.
3. "*Acid Dips for Copper and Copper-Base Alloys*" by B. H. McGar, Assistant Director of Research, Chase Brass and Copper Company, Waterbury, Conn.
4. "*Acid Dips for Zinc-Base Metals*" by Dwight M. Overcash, Brown-Lipe-Chapin Division, General Motors Corporation, Elyria, Ohio

6:00 P. M.

National Association of Metal Finishers. Dinner and Business Meeting, Club Rooms, 3rd Floor, Hotel Schroeder.

6:00 P. M. to 11:00 P. M.

Visit to Pabst Brewery.

Free Beer — Kalter Aufschnitt — Gemuetlichkeit.

WEDNESDAY, JUNE 29, 1949

7:45 A. M.

Branch Secretaries Breakfast, Room to be announced, Hotel Schroeder.

Educational Committee Breakfast, Parlor G, 4th Floor, Hotel Schroeder.

8:00 A. M.

Registration, Foyer, 4th Floor, Hotel Schroeder.

9:00 A. M. to 11:30 A. M.

Fourth Educational Session, Crystal Ball Room, Hotel Schroeder. Admission by registration badge only.

A Symposium on *Plating and Other Treatments of Light Metals*

Chairman: Mr. K. Gustaf Soderberg, Editor, Plating, Jenkintown, Pa.

1. "*Plating on Aluminum*" by Fred Keller, Chief, and Walter G. Zelley, Metallography Division, Aluminum Research Laboratories, Aluminum Company of America, New Kensington, Pa.
2. "*Cleaning, Acid Treatment, and Chemical Brightening of Aluminum*" by Dr. Walter R. Meyer, President and Technical Director, and Steven H. Brown, Research Chemist, Enthone, Inc., New Haven, Conn.
3. "*Amorphous Phosphate Coatings for Protection of Aluminum Alloys and for Paint Adhesion*" by Alfred Douty, Chief Chemist, and F. Palin Spruance, Jr., American Chemical Paint Company, Ambler, Pa.
4. "*Electroplating on Magnesium and Its Alloys*" by Herbert K. De Long, Laboratory Development Division, Magnesium Laboratories, The Dow Chemical Company, Midland, Mich.

12:00 Noon

International Fellowship Club Golf Tournament, North Shore Country Club. Joseph J. Duffy, Jr., Pennsylvania Salt Manufacturing Company, Chairman.

Transportation should be arranged through the Golf Committee.

Prizes will be awarded. All handicap groups have a chance to win. An informal luncheon will be served at the Club between 12:00 Noon and 1:30 P. M. Tee-off time is between 1:00 P. M. and 2:00 P. M. Bring your clubs and shoes.

12:15 P. M.

Picnic and Outing, at Brown Deer Park. Buses leave Hotel Schroeder from 5th Street (East) entrance.

Luncheon—Music—Entertainment.

Wear your outing clothes.

A ticket to this event is included in the pass book furnished to each registrant

2:00 P. M.

Research Committee Meeting, Parlor F, 4th Floor, Hotel Schroeder.

6:30 P. M.

Research Committee Dinner, Parlor G, 4th Floor, Hotel Schroeder.

7:00 P. M. to 11:00 P. M.

Visit to Pabst Brewery.

Free Beer — Kalter Aufschnitt — Gemuetlichkeit.

THURSDAY, JUNE 30, 1949

8:00 A. M.

A. E. S. Research and Educational Committee Breakfast.

Room to be announced, Hotel Schroeder.

Registration, Foyer, 4th Floor, Hotel Schroeder.

9:00 A. M. to 11:30 A. M.

Educational Session on A. E. S. Research, Crystal Ball Room, Hotel Schroeder. Admission by registration badge only.

Chairman: Dr. Louis Weisberg, Consultant, New York City, and Research Committee Chairman

Introduction of the new Research Committee Chairman, Mr. W. M. Tucker, Eastman Kodak Company.

1. "*Distribution on Electrodeposited Metal on Some Simply Shaped Cathodes*", a contribution from A. E. S. Research Project No. 11, by Dr. John Kronstein, Professor and Head of Chemical Engineering, and Lester C. Morton, Evansville College, Evansville, Ind.
2. "*Outstanding Problems of Porous Structure in Electrodeposits*", a contribution from A. E. S. Research Project No. 6, by Dr. N. Thon, Frick Chemical Laboratory, Princeton University, Princeton, N. J.
3. "*The Present Status of Plating Room Waste Disposal*", a contribution from A. E. S. Research Project No. 10, by Dr. Barnett F. Dodge, Professor of Chemical Engineering, Sterling Chemistry Laboratory, Yale University, New Haven, Conn., and Dr. Fred C. Gurnham, Professor of Chemical Engineering, Tufts College, Medford, Mass.

2:00 P. M.

Final Business Session, East Room, Schroeder, President Samuel S. Johnston presiding.

7:00 P. M. to 1:00 A.M.

Annual Banquet, Crystal Ball Room, Hotel Schroeder.

Dinner — Awards — Entertainment — Music—Dancing.

A ticket to this event is included in the pass book furnished to each registrant.

Ladies' Committee, left to right, front row: Mrs. Robert Steuernagel, Mrs. A. F. Johnson, Mrs. Glen Schwemmer, Mrs. Rodney Olsen, and Mrs. T. D. Hartshorn. Back row: Mrs. William C. Geissman, Mrs. Vincent Mattacotti, Mrs. Leslie Diveley, Mrs. Henry Bornitzke, Mrs. Jack Geissman, and Mrs. R. F. McGuire, Chairman. Mrs. Phil Ritzenthaler is also a member of the Committee

WELCOME TO THE LADIES

THE Milwaukee Branch of the American Electroplaters' Society welcomes you to the 1949 Convention. The program that the Ladies' Committee has arranged should please you. It has been planned to allow you time to visit the many points of interest in and around Milwaukee.

The Outing will be held in Brown Deer Park, one of the largest and most beautiful in Wisconsin. The bus ride to the park will give you an opportunity to see Memorial Drive, along the shore of Lake Michigan. Milwaukee's Museum is very well worth visiting and is only three blocks from the Convention Headquarters in Hotel Schroeder. A beautiful flower conservatory is found in Mitchell Park, a short distance south of the downtown business district.

A member of the Ladies' Committee will be at the registration desk during each day of the Convention for your help and convenience.

HAZEL S. MCGUIRE, *Chairman,*
Ladies' Committee

Mrs. R. F. McGuire, Chairman

LADIES' PROGRAM

Central Standard Time Used Throughout

SUNDAY, JUNE 26, 1949

4:00 P. M.

Registration, Foyer, 4th Floor, Hotel Schroeder.
The Registration Fee of $10.00 entitles registrant to a book of tickets which can be used for admission to certain Convention functions and activities as listed in this program.

The Ladies' Committee will have available for free distribution one theater ticket for each registrant.

MONDAY, JUNE 27, 1949

8:00 A. M.

Registration, Foyer, 4th Floor, Hotel Schroeder.

2:30 P. M. to 4:00 P. M.

Tea will be served in the Empire Room of the Hotel Schroeder. This is an excellent opportunity to become acquainted.

8:30 P. M. to 1:00 A. M.

Open House, Crystal Ball Room, Hotel Schroeder, under the auspices of the International Fellowship Club.
Music — Dancing — Buffet served at 10:00 P. M.

A ticket to this event is included in the pass book furnished to each registrant.

TUESDAY, JUNE 28, 1949

8:00 A. M.

Registration, Foyer, 4th Floor, Hotel Schroeder.

Forenoon

Open for personal activities.

1:00 P. M.

Aunt Ella's Society Luncheon Party, Empire Room, Hotel Schroeder, sponsored by Oakite Products, Inc., D. N. Clarin, Secretary.
You will find the excellent luncheon and entertainment a real treat.

8:00 P.M.

International Fellowship Club's "Plato" Party, Crystal Ball Room, Hotel Schroeder, under the direction of Joan Trumbour Wiards.
Prizes.

WEDNESDAY, JUNE 29, 1949

8:00 A. M.

Registration, Foyer, 4th Floor, Hotel Schroeder.

Forenoon

Open for personal activities.

12:15 P. M.

Picnic and Outing, at Brown Deer Park. Buses leave Hotel Schroeder from 5th Street (East) entrance.
Luncheon—Music—Entertainment.
Wear your outing clothes.

A ticket to this event is included in the pass book furnished to each registrant.

7:00 P. M. to 11:00 P. M.

Visit to Pabst Brewery.
Free Beer — Kalter Aufschnitt — Gemuethlichkeit.

THURSDAY, JUNE 30, 1949

8:00 A. M.

Registration, Foyer, 4th Floor, Hotel Schroeder.

12:15 P. M.

Luncheon and Style Show, Empire Room, Hotel Schroeder.
A ticket to this event is included in the pass book furnished to each registrant.

7:00 P. M. to 1:00 A. M.

Annual Banquet, Crystal Ball Room, Hotel Schroeder.

Dinner — Awards — Entertainment — Music—Dancing.

A ticket to this event is included in the pass book furnished to each registrant.

ABSTRACTS OF CONVENTION PAPERS

THE CUSTOMER LOOKS AT PLATED PRODUCTS, *by Thor H. Westby and R. E. Parkinson.*

A general discussion is offered of characteristics of plated products that the consumer desires, whether or not he has been getting what he wants, and what the plating industry and distributors of products can do to set sensible specifications and to control quality so as to meet these specifications.

PROCESS CONTROL IN ELECTROPLATING, *by R. E. Harr.*

This paper deals with (1) maintenance of solutions and equipment, including tests and additions to control major solution constituents, spectrographic and other tests for kind and amount of impurities, and rack design and maintenance; (2) inspection, including use of Magne-gage and sectioning to determine deposit thickness, relation of minimum to maximum deposit thickness, establishment of control limits for thickness and use of control charts in maintaining it within such limits, and finish allowances for threaded parts.

THE JOB PLATING SHOP BUSINESS, *by Raymond M. Shock.*

The role of the job shop in the industry, the present status of activity and profits in the job shop business, outlook for the future, and services rendered by job shop organizations are subjects of this paper.

AVAILABILITY OF PLATING MATERIALS, *by J. J. Duffy, Jr., L. K. Lindahl, Henry Mahlstedt, Ed. McGovern, C. R. Ince, C. H. Sample, Dr. B. W. Gonser and Ralph F. Burns.*

Background information, present situation, and future prospects will be discussed.

PR CYANIDE COPPER PLATING, *by George W. Jernstedt.*

Conditions, including time cycles and ratios, solution composition, addition agents, etc., are given for the application of PR to cyanide copper plating. A description of the first inorganic high-speed cyanide solution is given. Examples of the smoothening possible with this process are shown. The method of obtaining various physical properties, especially hardnesses from 100 to 220 Vickers with excellent ductility, is explained. A description of commercial equipment as now available is given, and the operating characteristics of this equipment shown.

Left to right:
W. L. Pinner
T. H. Westby
R. E. Parkinson
R. E. Harr
R. M. Shock

J. J. Duffy, Jr.
L. K. Lindahl
H. Mahlstedt
E. McGovern
C. H. Sample

ABSTRACTS OF CONVENTION PAPERS

Electrodeposition of Nickel at High Current Densities, *by W. A. Wesley, W. W. Sellers and E. J. Roehl.*

The theory of limiting current densities was applied to nickel deposition and led to the conclusion that it is theoretically possible to plate nickel at rates as high as 8500 asf. The practical limit would, therefore, be set not by electrochemical factors but by such engineering requirements as maintenance of an adequate rate of motion of the electrolyte versus the cathode surface, prevention of overheating of contacts, electrolyte and cathode, etc. In a controlled-flow apparatus sound nickel deposits were actually made at the rate of 0.001 inch in 16 seconds from the chloride bath, with high anode and cathode efficiencies. Such deposits proved to be less ductile than those made at normal rates but were of good protective value in porosity and atmosphere tests. Electrochemical data are presented which should be useful in designing equipment for high-speed nickel plating and even for increasing ordinary rates by providing uniform motion.

Factors That Influence Operating Characteristics of Chromium Baths, *by J. B. Winters and R. O. Hull.*

The paper deals with the wide variation in results obtained in chromium plating, particularly over nickel. Among the factors that influence the successful application of chromium over nickel are the kind of nickel—gray or bright—addition agents in bright or gray nickel, activation of nickel before chromium plating, passivity of nickel developed after plating either by use of improper transfer cycles or in the chromium bath itself, which is influenced by bath composition (sulfate ratio and strength) and temperature, and time of immersion in the chromium bath before current is applied. Activating dips before chromium are discussed, and mention is made of Hull-Cell control of chromium baths. By appropriate recognition of the factors that enter into chromium plating, consistently good operation can be assured.

Scratch Hardness and Abrasion Hardness of Electrodeposited Chromium, *by J. M. Hosdowich.*

The scratch hardness of chromium electrodeposited under a wide range of conditions was determined by means of the Buerbaum microcharacter. The abrasion hardness of the electrodeposited chromium was determined by means of an automatic machine in which a grinding wheel was intermittently brought in contact with the test piece. A conclusion of practical value to the chromium plater is that both the scratch hardness and the abrasion hardness of any chromium deposit can be accurately estimated from its appearance—regardless of the temperature and current density under which it was deposited.

Left to right:
B. W. Gonser
R. F. Burns
F. K. Savage
G. W. Jernstedt
W. A. Wesley

W. W. Sellers
E. J. Roehl
J. B. Winters
R. O. Hull
J. M. Hosdowich

ABSTRACTS OF CONVENTION PAPERS

ACID DIPS IN CLEANING CYCLES FOR FERROUS METALS, *by Ivan C. Hepfer (introduction to Round Table Discussion).*

Important basis-metal and solution factors, especially those of a controversial nature, are presented.

PREVENTION OF EMBRITTLEMENT OF HIGH-CARBON STEEL, *by Richard M. Wick (introduction to Round Table Discussion).*

Treatment cycles for minimum embrittlement and for hydrogen removal are discussed.

ACID DIPS IN CLEANING CYCLES FOR COPPER-BASE ALLOYS, *by B. H. McGar.*

Pickling, stain-removal, and bright-dipping methods are treated.

ACID DIPS IN CLEANING CYCLES FOR ZINC-BASE ALLOYS, *by Dwight M. Overcash.*

Brief literature survey is made and questionnaire data are given showing present practices in the field.

PLATING ON ALUMINUM, *by Fred Keller and Walter G. Zelley.*

The most commonly used process for preparing aluminum for plating, the alkaline zinc immersion process, will be discussed in detail, including effects of surface finishing, structure, and composition of the aluminum alloy. The beneficial effect of chromium over nickel in reducing corrosion of underlying aluminum will be demonstrated.

AMORPHOUS PHOSPHATE COATINGS FOR PROTECTION OF ALUMINUM ALLOYS AND FOR PAINT ADHESION, *by Alfred Douty and F. Palin Spruance, Jr.*

Details of a new process for treating aluminum alloys and characteristics of the new coatings are given. Data are presented on effects of treatment conditions on coating weight; resistance of painted and unpainted coatings, alone and in contact with dissimilar metal, to outdoor exposure and salt fog test; and adhesion of baked and air-dried paint systems.

Left to right:
W. Blum
I. C. Hepfer
R. M. Wick
B. H. McGar
D. M. Overcash

K. G. Soderberg
F. Keller
W. Zelley
W. R. Meyer
S. H. Brown

ABSTRACTS OF CONVENTION PAPERS

CLEANING, ACID TREATMENT AND CHEMICAL BRIGHTENING OF ALUMINUM, *by Walter R. Meyer and Steven H. Brown.*

Pre-cleaning, alkaline cleaning, etching, and chemical polishing and brightening, of aluminum will be treated.

ELECTROPLATING MAGNESIUM AND ITS ALLOYS, *by Herbert K. De Long.*

This paper furnishes details of cleaning and pickling, final oxide removal and deposition of an adherent zinc film from a pyrophosphate-fluoride zinc dip, copper striking, plating (including barrel plating), as well as stripping methods. Data on outdoor, salt-spray and humidity exposure of silver and copper-nickel-chromium plated panels are also presented.

DISTRIBUTION OF ELECTRODEPOSITED METAL ON SOME SIMPLY SHAPED CATHODES, *by John Kronsbein and Lester C. Morton.*

Simple, nonmathematical language is used to describe the predictions from theoretical considerations as to how electrodeposited coatings are distributed over cathodes of simple shapes under specified ideal conditions, to discuss reasons for predictable and unpredictable deviations of this distribution as encountered under experimental conditions and in the plating shop, and to give some comparisons of theoretical and experimental results.

OUTSTANDING PROBLEMS OF POROUS STRUCTURE IN ELECTRODEPOSITS, *by N. Thon.*

The different types of porous structures found in electrodeposits and the factors associated with such structures are discussed. The nature of the metal, thickness of the deposit, conditions of plating, and condition of the surface on which the deposit is formed are considered. Measurements of permeability to air and other gases, permeability to cathodic hydrogen, hydrogen occlusion and adsorption, as well as electron diffraction studies of crystal structure are necessary steps in the attack on this problem.

THE PRESENT STATUS OF PLATING ROOM WASTE DISPOSAL, *by Barnett F. Dodge and C. Fred Gurnham.*

A number of plants for disposal of all kinds of plating waste will be shown in slides and described.

Left to right:
A. Douty
F. P. Spruance, Jr.
H. K. De Long
L. Weisberg
J. Kronsbein

L. C. Morton
N. Thon
B. F. Dodge
C. Fred Gurnham

PLATED-WARE BRANCH EXHIBITS

EAST ROOM, HOTEL SCHROEDER

THIS year the exhibit spotlight is entirely on the products of the plater's skill. As the only exhibits at the 36th Annual Convention of the American Electroplaters' Society, the Branch Exhibits of Plated Ware have been given an outstanding display location in one of the attractively appointed banquet rooms of the Convention Headquarters Hotel, the Schroeder.

Again, as in the past several years, the Branches are competing for the honor of having a prize-winning exhibit. An impartial committee composed of representatives of five different Branches will have the unenviable task of selecting the three best exhibits.

A visit to the Branch Exhibits of Plated Ware will be well worth the while of everyone in attendance at the Convention and will be a tribute to those Branches cooperating in the Exhibit.

TIME SCHEDULE FOR BRANCH EXHIBITS

Monday, June 27	12:00 Noon to 6:00 P. M.
Tuesday, June 28	9:00 A. M. to 6:00 P. M.
Wednesday, June 29	9:00 A. M. to 12:00 Noon

EUGENE C. BOSL, *Chairman,*
Branch Exhibits Committee

PLANT VISITATIONS

THE following Milwaukee Plants have kindly consented to conduct plant tours for the convenience of the A. E. S. Convention delegates and visitors.

GLOBE UNION, INC.

Fabrication, finishing and assembly of roller skates will be viewed

NASH-KELVINATOR COMPANY, BODY DIVISION

The assembly line for Nash automobile bodies has been opened for inspection

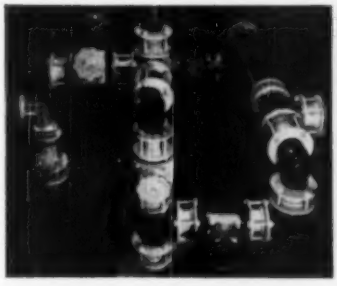
GENERAL ELECTRIC COMPANY, X-RAY DIVISION

A general tour of the plant, in which X-Ray equipment is being manufactured

Delegates and visitors will have an opportunity to register for these visits during the Convention at Convention Headquarters.

OMER N. DOYLE, *Chairman*,

Plant Visitations Committee



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The concave surface on this contact wheel fits the job perfectly.

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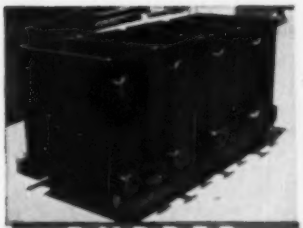

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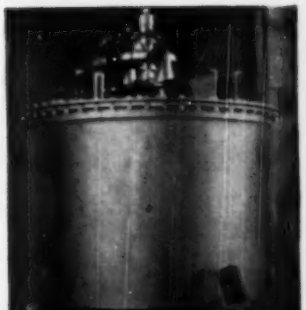

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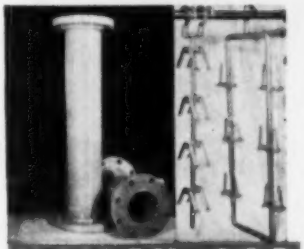

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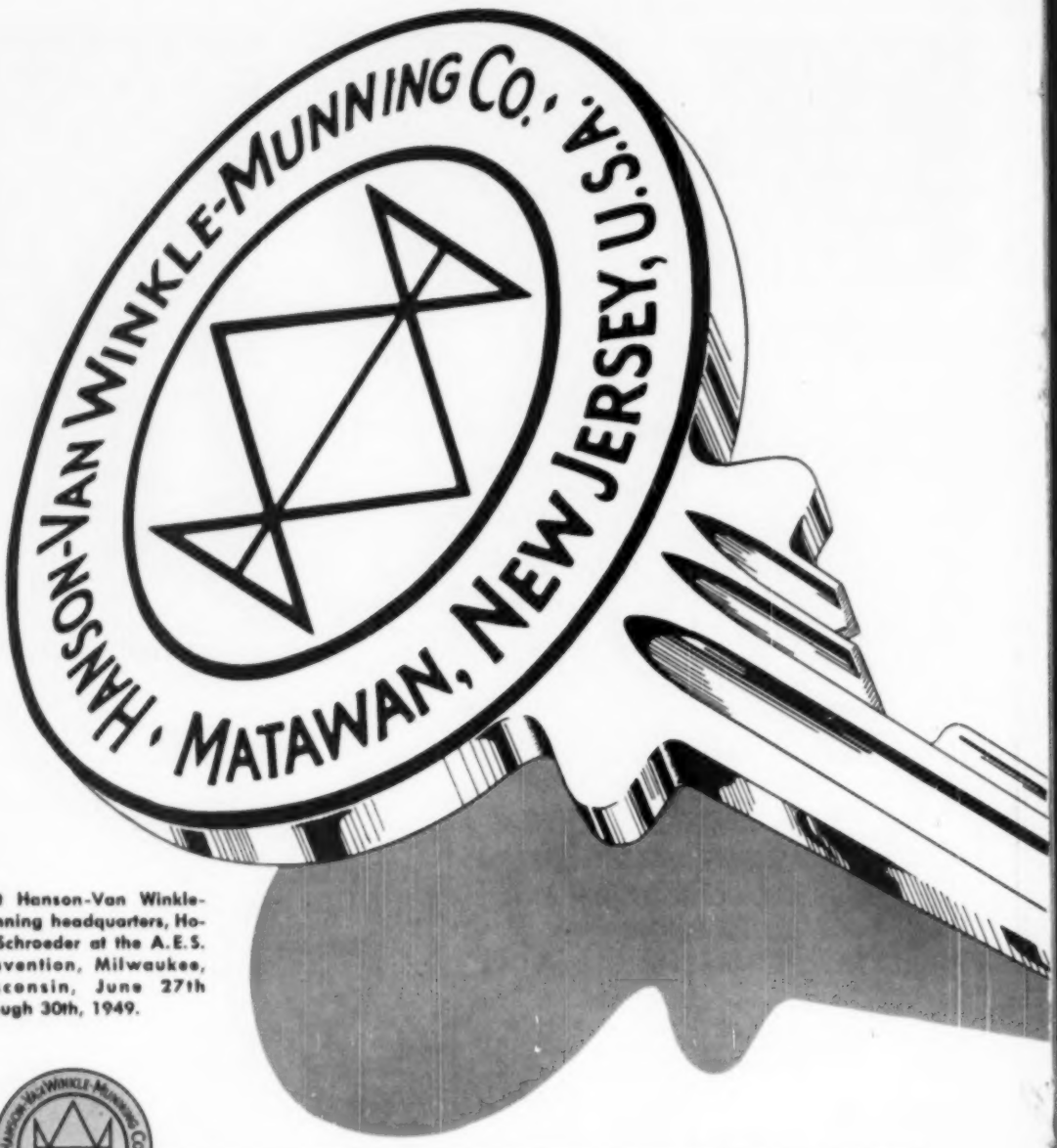

Visit Hanson-Van Winkle-Munning headquarters, Hotel Schroeder at the A.E.S. Convention, Milwaukee, Wisconsin, June 27th through 30th, 1949.

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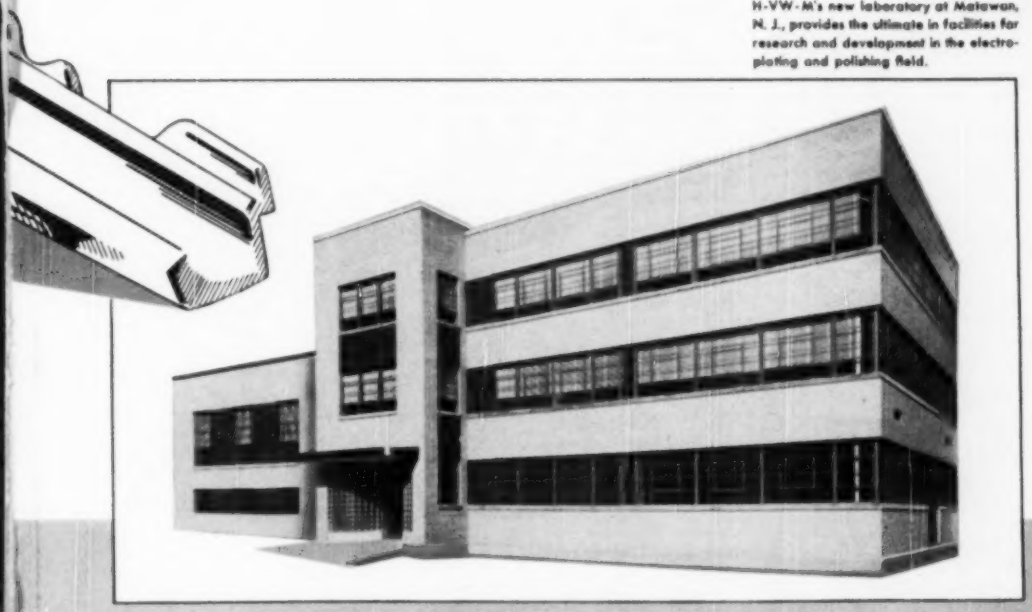


ANNUAL REPORTS OF OFFICERS OF THE AMERICAN ELECTROPLATERS' SOCIETY

PRESIDENT'S REPORT

Johnston

The report of the President is the summation of several years of service and experience as a member of the Executive Board, the last of which was served as the presiding chairman. It is an estimation of the present status of Society affairs and a carefully considered recommendation of future policy.

Constitution and By-Laws

At the close of the last Convention, the Society began operation under a new Constitution and By-Laws. A great deal of time, thought, and hard work went into the revision of the Society's code, and the adoption of the present Constitution at Atlantic City was generally hailed as a long step forward. At the end of one year, it is safe to say that Society operations are greatly improved.

It is recognized that we do not have a perfect set of regulations. The fact that there are amendments proposed for consideration attest to that, but after only one year of operation, proper perspective is lacking as to specific needs for further revision. Certain recommendations of policy are contained in other sections of this report, and these proposals should be studied in the light of incorporation into the Constitution by amendment or addition.

Industrial Finishing Exposition

In 1947 in connection with the Detroit Convention, an Industrial Finishing Exposition was staged, the first such show in some ten years. This Exposition was such an outstanding success, both artistically and financially, that it was repeated in 1948 in conjunction with the Atlantic City Convention.

During the preparatory period of the 1948 Show and during the Convention itself, there was an undercurrent of dissatisfaction among the exhibitors with the frequency of expositions. It was obvious that the gathering of data necessary to the establishment of policy could not be performed by the Executive Board. Accordingly, Mr. W. M. Phillips, Head of the Electrochemistry Department of the General Motors Corporation and a Past President of the Society, was appointed chairman of a committee to survey the problem and make recommendations for future guidance. As members of his committee Mr. Phillips chose Mr. Louis W. Hague, President of Hanson-Van Winkle-Munning Company; Mr. R. M. Shock, Executive Secretary of the National Association of Metal Finishers; Mr. A. R. Putnam, Advertising Manager of PLATING; Mr. D. X. Clarin, District Manager of Oakite Products, Incorporated; and, as liaison member, Mr. C. F. Nixon, Third Vice-President of the Society. After a careful survey, the committee made the following recommendations to the Executive Board:

1. That no Industrial Finishing Exposition be held at the next Convention at Milwaukee.

2. That the Industrial Finishing Expositions be held from three to five years apart, and that the next Exposition, providing conditions are favorable, be held four years from the date of the last Exposition at a location in the Middle West, such as Chicago, Cleveland, or Detroit.

In line with these recommendations, the Executive Board has passed a resolution that no Exposition be held in connection with the 1949 Convention in Milwaukee, the 1950 Convention in Boston, or the 1951 Convention in Los Angeles.

Public Relations

The Executive Board has long been aware of the need and desirability of a publicity or public relations program to spread information about the Society and the electroplating industry among the general public. Plated products of one form or another are used by virtually every person in the civilized world, but the vast majority of these people are unaware of the role that plated materials play in their everyday existence. However, failure of a plated part due to ignorance, misuse, or misapplication arouses an immediate antipathy out of all proportion both to the specific failure and to the excellent service rendered by plated finishes in many unrecognized cases.

To educate the public to plated finishes and parts is rightly a function of this Society, but such a program requires a considerable expenditure of money. It has been suggested that profits from Expositions be applied to the promotion of public relations, and Mr. Phillips' committee was asked to make recommendations concerning public relations activities on a plane consistent with profits which have accrued from the two previous expositions. This committee has made two recommendations which are financial in character.

1. That a reserve fund be established for the underwriting of future Industrial Finishing Expositions, such funds to be set aside from the earnings of the two

previous Conventions, $10,000 being a suggested sum for such a fund.

2. That $3,600 per year be expended during the next three fiscal years starting April 1, 1949, for public relations activities.

At this writing, the budget for the next fiscal year has not been prepared, but it will undoubtedly contain a request for an expenditure of $3,600 on public relations activities. The support of this expenditure by the Delegates is earnestly solicited. The findings of Mr. Phillips' committee have been profound and should be a distinct benefit to the Society.

Convention Sites

With the establishment of a definite policy concerning the frequency of Expositions, there is every indication that with reasonable foresight, Industrial Finishing Expositions can be scheduled to provide professional benefits to workers in the metal finishing field and financial gain to the Society. In recognition of this policy, the Executive Board has passed the following resolution:

"Any Branch desiring to bid for an Annual Convention, with an Industrial Finishing Exposition when authorized, shall furnish the Executive Board with a letter of intent and supporting data indicating the adequacy of the site selected for the purpose at least two months in advance of the Annual Meeting at which the bid is to be presented".

It is necessary to choose a site for the Annual Convention which would at the same time adequately meet the requirements for a successful Industrial Finishing Exposition. If an Exposition should be scheduled at an unfavorable site, the Society could lose prestige and the future of Expositions could be seriously impaired. There are not a great number of cities with facilities for holding both an A. E. S. Convention and a large Industrial Finishing Exposition. With the field narrowed down, it is important that the Delegates be well informed in order that they can wisely choose a Convention and Exposition site.

Convention Programs

It is significant that there has not been a printed program containing advertising since the Pittsburgh Convention of 1946. The approval of Convention Committees in Detroit, Newark, and Milwaukee of the present plan of presenting the Convention Program has resulted in a great saving.

Advertising obtained for the Convention Program was largely of the complimentary variety and pulled advertising revenue away from the Society's publication. The statement was made in 1946 that the Convention Program was the thirteenth issue of The Monthly Review. In previous years, Convention Programs had been handled by other than Society advertising agents. This created distrust and suspicion in the minds of advertising agencies and the advertisers themselves, and gave the impression, which was all too true, that American Electroplaters' Society's business affairs were not well coordinated.

The present plan, which has been used for three years straight, is to designate the June issue of Plating as the Convention issue. This has resulted in increased advertising revenue for this issue, gained through the regular business channels of the Society. The make-up of the program of Convention activities has been such that it could be reprinted at a very nominal cost and distributed to the registrants at the Convention.

With the growth of the Society and consequent growth in size of Conventions, the preparation and publication of a paid advertising program became a major undertaking. The profits were small in proportion to the risk and work involved. Again, there is no lasting benefit to be gained from the issuance of an elaborate program which has no function after the Convention has closed. It is hoped by the Executive Board that Branches that are hosts at succeeding Conventions will cooperate with this plan.

Branch Solicitation of Funds

In this same vein, recognition is given to a problem which has become increasingly acute in the past few years. This is the custom of solicitation of funds from supply houses in support of Branch and regional activities.

The Executive Board, as the elected business representative of the Supreme Society, is charged with the responsibility of two financial ventures: publication of a monthly periodical and, through the Research Committee organization, the enrollment and maintenance of Sustaining Memberships. Every effort has been made, and this effort is continuing, to make Plating the best medium for suppliers to the industry to present their story and advertise their wares. By the same token, it is a trust that funds secured from Sustaining Members be devoted to basic research. This program is justifying its existence by the excellence of the flow of reports now coming from the Research Committee.

An added activity is the solicitation of the field for speakers who will participate in the various educational programs sponsored by the Branches. The response to this appeal has been indeed generous, and 95 per cent of the speakers listed in the July, 1948 issue of Plating are available at no expense to the meeting.

The Branches present competition to these activities of the Supreme Society by requests for contributions ranging from $10 to $100 to support Annual Meetings or Regional Meetings. For this contribution, the donor receives listing in the program as a sponsor. In most cases, the donations are applied to the social end of these meetings apart from the declared aim "An Educational Society". The expenses of a speaker at an educational session are in excess of this contribution. The extent to which this practice has grown is illustrated by the statement from one concern that twenty-two such requests were received last year.

The trend of purchase of advertising space in Plating is downward. During the past year a number of Sustaining Members have declined to renew their memberships. Economic conditions have declined during this same period, but this problem of financial competition within the Society is still present. Continuation can lead only to a weakening of both the Society and the Branches.

Branch By-Laws

While the Society has emerged with a new Constitution and set of By-Laws, this code of regulations is applicable only to the Supreme Society and the dealings of the Branches with the National Office. There are few provisions in the Constitution and By-Laws which bear on the internal workings of the Branches. The strength of the National Society is in the strength of the Branches, and it is urged that all the Branches formulate and adopt a set of By-Laws to govern their own operation.

Such By-Laws should be designed to fix the responsibility of conduct of Branch business. The duties of the officers should be detailed and a pattern set for the discharge of those duties. In the absence of a set of by-laws, Branch members cannot be assured that their interests are being protected. Negligence and irresponsibility cannot be judged unless a specific assignment of responsibility is made. The Delegates are urged to return to their Branches with the determination that the Branches immediately design and adopt a set of By-Laws for their guidance.

Reserve Funds

The financial structure of the Society is a loose one. The General Fund contains all of the Society's resources with the exception of the Research Fund. In years past, the Executive Board has presented to the Delegates each year a budget which was, they hoped, balanced. Expenditures were estimated on the high side and income estimated conservatively. Most years resulted in a profit and this profit became a part of the General Fund. The Society has become big business, particularly in the publication field.

Future consideration should, therefore, be given to establishment of reserve funds for both the publication and the Society's activities. Since the purpose of such reserve funds is to guarantee the successful operation of the Society and of the publishing business in which it is engaged during periods of unsettled economic conditions, the magnitude of the funds should be determined in relation to the magni-

tude of the monies involved on an annual basis. Based on our present operations, a reserve of $100,000.00 for the publication and $50,000.00 for the Society would appear reasonable.

Disregarding the money on demand deposit, which includes the profit from the last two Industrial Finishing Expositions and which is being ear-marked for specific purposes, the Society at present has a reserve in savings fund deposits amounting to $50,000.00. It would be reasonable, therefore, to build up these reserves to the suggested amounts from profit from the Society's over-all operations including Conventions and Industrial Finishing Expositions. Since the Society is a non-profit educational organization, any profit from any source in excess of the annual operating expenses, once the reserve funds have been established, should then be used to expand the educational features and other benefits to members and to promote the plating industry through a well conceived publicity and public relations program.

Branch Delegations

At the last Convention, it was noted that a great number of Branches were represented by few Delegates in attendance at the Business Sessions of the Supreme Society. Some Branches were not represented at all, others by one Delegate and still others by two. Such a procedure by the Branches results in poor relations between the Branches, the Supreme Society, and the National Office. Incomplete information is carried back to the Branches and results in unnecessary friction in the conduct of the Society's business.

It has been suggested by some Branches that Delegates and their alternates be elected as soon as possible after the close of the Annual Convention to serve until the end of the following Convention. The purpose of such a procedure would be to interest the Delegate in Branch affairs and give him ample opportunity to acquire the needed perspective of how the Branch integrates into the Society as a whole.

This Society is made up of Branches and the Branches demand and get privilege. The Branches must realize that with privilege goes responsibility. The Branches must recognize their responsibility and have Delegates at the Annual Meeting of the Society for the conduct of the business of the Society.

Recognition of the Society

Additional recognition of the Society as an educational group was received during the year from the National Association of Corrosion Engineers. That group has formed the Inter-Society Corrosion Committee and asked this Society to appoint two members to represent it on the committee. Some of the objectives of this committee are:

1. To promote cooperation among the various technical societies working in the field of corrosion.

2. To provide a liaison between the various technical corrosion committees of the N. A. C. E. and other national technical societies.

3. To act in an advisory capacity to the technical societies interested in corrosion in an effort to promote progress of all and avoid excessive duplication of effort.

4. To recommend in which society a proposed new activity might best be carried out without, however, attempting to define or limit the field of activity of any society.

5. To stimulate the publication of reliable data on corrosion and to provide publicity for conferences and conventions in this field.

It was the feeling of the Executive Board that the American Electroplaters' Society could benefit from this activity. To represent the Society on the committee, the Board appointed Dr. Richard M. Wick, Past Chairman of the Research Committee, and Mr. Kenneth M. Huston, Past President of the Society. Both of these men have an excellent background of experience in the field of corrosion and can represent the Society with distinction.

Demands on Society Officers

During the past year all but about six of the Branches in the United States have been visited by a National officer. This has required considerable expenditure of time, effort and money by the officers making these visitations. Efforts were made to visit all Branches and the Executive Board sincerely regrets that it failed to reach this goal. In addition, the Executive Board members gave freely of time and energy in the conduct of correspondence relative to Society affairs.

It is recommended to the Delegates that they consider thoroughly the qualifications of the candidates whom they propose as officers of the Society. While it is a great honor to become an officer of the Society, it requires diligence, time, and a sincere desire to work to carry out the assignment.

Acknowledgments

I wish to thank my employer, the Weirton Steel Company, for making available time and funds for carrying out my assignments as your officer. I wish also to give grateful acknowledgment of the wholehearted cooperation of the other members of the Board, the Executive Secretary, and the employees of the National Office, without whose generous help my task would have been impossible.

S. S. Johnston

FIRST VICE-PRESIDENT'S REPORT

Logozzo

The report of the First Vice-President this year differs somewhat from former reports because of the reassignment of certain educational activities under the new Constitution adopted at the 1948 convention.

Convention Papers

The Editorial Board, under the direction of the Executive Secretary, now handles the solicitation of the technical papers for the Society's publication and for the educational sessions of the Annual Convention of the Society. The Board is composed of talented members volunteering their services, and the Society owes them a debt of gratitude. It is the writer's opinion that their performance during the first year of operation on the new basis has proved eminently satisfactory from the Society's viewpoint and that as they become better organized in their operations further improvement in the quantity and quality of the papers may be expected. With the cooperation of the Editorial Board it is hoped to reduce the time required in publishing the Proceedings and to hasten the time when the Handbook will be available.

Branch Speakers and Meetings

Several years ago I proposed that the speakers' list be printed in the July issue of our monthly magazine rather than in the November issue. This recommendation was made to give the Branches more time to prepare their speakers' list for the following season. It now falls to my lot as First Vice-President to prepare this listing of speakers, and I have some specific recommendations to help strengthen the Branch educational programs.

Most of the speakers, volunteering their time, talents and information, usually at their company's expense, ask little in return but should be accorded the following considerations:

1. Branches should plan their season's activities in advance to allow speakers ample time to plan their itinerary.

2. Speakers should be met by prearrangement, plant visitations should be planned when possible, as well as dinner with the local officers and dignitaries prior to the meeting. In short, each monthly meeting should be an event.

3. In deference to the speaker, long drawn out business sessions should be avoided prior to the evening's educational session.

4. Business meetings should be arranged in between monthly educational programs. Many Branches alternate business meetings at the various officers' homes.

5. A well-rounded monthly educational meeting can be executed as follows:

(a) Dinner, at 6:30 to 7:00 o'clock

(b) Movies, available through many sources at no charge

(c) Book reviews or latest developments. Ten minutes each month will cover this.

(d) Main speaker

(e) Question period

(f) Open question box on any finishing subject

This type of program is being successfully utilized by many of the Branches and has definitely stimulated attendance.

The Detroit Branch has innovated something this year that all chapters should copy. It is introducing as a co-speaker a member of the Detroit Branch, and he starts off the program with a fifteen-minute talk. Each succeeding month another prospective speaker gets his start; I believe all Branches should promote this idea.

During the year just passed the First Vice-President attended all Executive Board Meetings, as well as handled the usual voluminous correspondence. All assigned Branches were visited, plus several others, before which educational talks were given.

This office is most appreciative of the cooperation accorded it by all A. E. S. members during the past year. It is particularly grateful for the wonderful response given in the preparation of the speakers' list for the 1949–1950 season. As long as we have this type of cooperation, the A. E. S. will always prosper in its objects, namely, the education in all phases of the finishing sciences.

ARTHUR W. LOGOZZO

SECOND VICE-PRESIDENT'S REPORT

Neill

The Second Vice-President, as usual, has been charged with the problems of membership. The past year has brought to fruition the plans laid in Mr. Logozzo's year of granting charters to the Louisville and Saginaw Valley Branches. These Branches, as well as the Allentown-Reading Branch, have been duly presented with permanent charters and are now full-fledged additions to the Society. Temporary charters have been granted to Branches in Winston-Salem, Windsor (Western Ontario), and Hamilton, Ontario. There have also been encouraging indications that the Society may have a Branch in the Deep South in the near future.

The membership growth has ceased during the past year. Table I sheds some light on the reasons for this. On one hand the number of new members elected shows a sharp drop and on the other the number lost by suspensions and resignations has continued its steady climb.

It is very evident that concerted efforts must be made to gain new members, and the personal experience of the Delegates will testify that there are many thousands engaged in plating activities who should be members of the Society. Similarly, the Branches should take particular care in finding out by personal contacts on the part of the members of their membership

MEMBERSHIP CHANGES DURING 1948-1949

BRANCH	Membership May 1, 1948	Elected	Reinstated	Transferred In	Transferred Out	Resigned	Suspended	Dead	Unexplained Gain or Loss	Net Gain	Membership March 31, 1949
Adelaide	65	20	2	...	...	4	7	...	...	11	76
Allentown-Reading	...	36	...	7	...	...	...	...	...	43	43
Baltimore-Washington	95	8	5	...	1	6	13	2	...	−13	82
Boston	164	16	1	...	...	1	27	...	...	−11	153
Bridgeport	154	23	1	3	1	2	17	1	...	6	160
Buffalo	94	9	...	3	...	3	20	1	...	−12	82
Chicago	445	20	8	6	3	8	60	1	...	−84	291
Cincinnati	80	12	...	2	3	2	...	...	+1	10	90
Cleveland	190	17	...	3	4	...	19	1	...	− 4	186
Columbus	36	7	...	...	1	3	3	...	...	...	38
Dayton	89	14	...	1	...	2	3	1	...	9	98
Detroit	407	28	...	1	4	5	29	1	...	20	427
Grand Rapids	148	24	4	3	2	1	18	...	...	12	160
Hartford	130	6	1	...	3	4	20	1	+2	−17	113
Indianapolis	101	6	...	1	4	...	...	...	...	3	104
Jackson-Lansing	94	11	...	...	1	...	13	1	− 1	− 5	89
Lancaster	46	14	...	...	...	1	...	...	...	13	59
Los Angeles	234	21	1	...	...	6	32	1	...	−17	217
Louisville	18	3	...	2	2	1	...	...	...	2	20
Melbourne	68	20	...	...	...	7	...	...	...	13	81
Milwaukee	128	7	...	...	1	1	...	1	...	4	132
Montreal	63	7	...	1	...	2	...	...	...	6	69
Newark	280	17	...	1	5	6	22	1	...	−24	256
New Haven	106	10	...	...	1	4	2	1	...	2	108
New York	273	11	3	...	4	1	16	1	...	− 8	265
Philadelphia	207	26	5	...	11	2	30	2	...	−20	187
Pittsburgh	145	16	1	3	8	5	18	1	...	−10	135
Providence-Attleboro	118	8	1	1	1	2	11	...	...	− 7	109
Rochester	120	26	...	2	2	7	13	1	...	5	125
Rockford	30	9	...	2	...	...	14	...	...	− 3	86
Saginaw Valley	38	14	...	16	...	...	...	1	...	29	67
St. Joseph Valley	98	5	...	1	1	...	23	...	...	−18	80
St. Louis	103	6	2	...	1	...	3	...	...	4	107
San Francisco	76	...	...	...	...	5	...	...	...	− 5	71
Southeastern	40	4	1	...	...	...	16	...	...	−11	29
Springfield	56	3	...	1	...	1	9	...	...	− 6	50
Sydney	88	20	1	...	...	3	6	...	...	20	108
Syracuse	77	14	...	3	2	6	6	...	+1	6	83
Toledo	66	4	1	1	2	...	16	2	+2	−10	56
Toronto	146	9	1	1	...	3	...	...	...	8	154
Twin City	78	6	...	...	...	1	6	...	...	− 1	77
Waterbury	138	8	3	...	1	...	11	3	...	− 6	132
At Large	104*	19	2	47	...	3	8	...	...	197	1231
Total	5,255	608	61	69	69	105	542	25	5	+18	5,297

*Including 21 in process of transfer.
†Including one in process of transfer.
‡Including 27 in process of transfer.

Necrology

The following members have died during the year. Many of them contributed greatly to the advancement of the Society which, with their Branches and friends, mourns their passing:

Baltimore-Washington Branch: Edward J. Peebles, Armond Tschantre
Bridgeport Branch: Charles Pataky
Buffalo Branch: Siebert Johnson
Chicago Branch: R. J. Nicholson
Cleveland Branch: Fred Matts
Dayton Branch: Walter Fraine
Detroit Branch: Donald H. Batdorff
Hartford Branch: Charles J. Twist
Jackson-Lansing Branch: F. Sylvester
Los Angeles Branch: Carl Dennis
Milwaukee Branch: John Andryski
Newark Branch: A. Pflomm
New Haven Branch: A. F. Morgan
New York Branch: Henry Levine
Philadelphia Branch: A. M. Robson, Eugene Zurbach, Sr.
Pittsburgh Branch: Herbert Patterson
Rochester Branch: R. H. Walker
Saginaw Valley Branch: R. E. Beuthin
Toledo Branch: Hugh Benner, Samuel Cole
Waterbury Branch: Edwin A. Maker, F. W. Swallwell, T. H. Webersinn

committees why a member resigns or puts himself in a position to become suspended. Knowing the facts and correcting any conditions within the Branch which rightly or wrongly may have been the cause, the Branches should be able to reduce the loss figure substantially.

Branches covering large areas face particular problems both in acquiring new members and, even more, in keeping their members interested. Some Branches have overcome these difficulties very successfully by holding meetings not only in the headquarters city but also in other cities where they have members. Others alternate their meetings regularly between two cities in which their membership is concentrated. It is suggested that all Branches who have this problem face it realistically and take steps along these lines which have proven successful.

This year the Branches placing highest in percentage membership gain in their particular groups will each receive fifty dollars in cash to be used as they see fit. Your Executive Board feels that such an award is much more acceptable than a trophy which may be of equal monetary value but which presents a real problem in care and display. The Branches winning the awards this year are in the first group Grand Rapids with a percentage gain of 7.8 per cent, in the second group Sydney with 22.8 per cent, and in the third group Saginaw Valley with 55.3 per cent. Your Executive Board has also decided to print the names of the winning Branches in bold-face type on the membership chart during the coming year to indicate their position of honor and as an incentive to the other Branches to beat them if they can.

Your Second Vice-President has visited the St. Joseph Valley, Cincinnati, Dayton, Detroit, and Indianapolis Branches during the year and presented the charter to the Louisville Branch. He has attended all Executive Board meetings and was instrumental in preparing the Index to the new Constitution and By-Laws which is now in the hands of the Branch Secretaries.

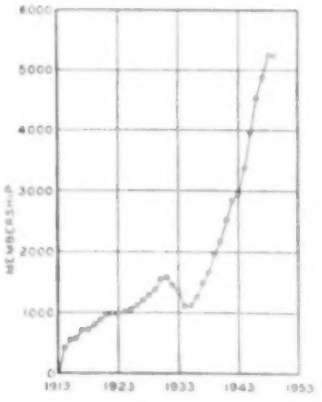
It might be worth mentioning that during the year your Second Vice-President served as a member of the speakers' panel of the Columbus Branch of the American Electroplaters' Society cooperating with the Columbus Technical Council Public Relations Program, speaking on the subject, "Electroplating from the Cradle to the Grave". This was done with the hope of promoting a better understanding of the importance of plating by the public in general and to advertise the merits of our Society in particular, with an eye to future membership gains.

One last thing—I want to thank the members of all the Branches I have visited for their very pleasant consideration and for the fact that they seemed genuinely interested in the affairs of the Society as I was able to present them.

WILLIAM J. NEILL

TABLE I. MAIN FACTORS IN THE GROWTH OF THE SOCIETY'S MEMBERSHIP

Year	Members Elected	Members Lost by Suspensions, Resignations	Net Gain in Membership
1943–1944	621	196	+462
1944–1945	724	126	+587
1945–1946	742	228	+556
1946–1947	808	440	+352
1947–1948	984	631	+351
1948–1949	608	647	− 18



Membership Changes, 1913-1949

THIRD VICE-PRESIDENT'S REPORT

Nixon

The present Constitution of the Society does not assign a specific task to the Third Vice-President; rather he is now a special assignment man available to assist the President and the Executive Board, of which he is a part, as circumstances may dictate. This is a suitable arrangement, I feel, after a year's experience in this capacity. Our Society's interests are diversified and involve stewardship of considerable sums of money. The honor bestowed upon me last June was appreciated at that time; I am now beginning to understand more fully the responsibilities that were bestowed upon me at the same time.

Your Third Vice-President has attended all Executive Board meetings called, has attended two Research Committee meetings, has served as a member of the Exposition and Public Relations Advisory Committee ably led by Mr. W. M. Phillips, is serving as Chairman of a Special Committee (Messrs. H. E. Head, A. Putnam, and D. X. Clarin) appointed by President Johnston to determine the best way of handling future expositions, has helped in a small way Mr. Bosl, Milwaukee's Branch Exhibits Chairman, has visited the Grand Rapids, Indianapolis, Cincinnati, and Western Ontario Branches, and has, almost daily, contributed his bit to the conduct of Executive Board business.

C. F. NIXON

PAST PRESIDENT'S REPORT

Huston

The normal assignment of the immediate Past President as a member of the Executive Board is that of counsel. This year, however, the duties amounted to considerably more than attendance at the five meetings of the Executive Board.

The Past President was appointed Chairman of the Law Committee to review Constitutional Amendments proposed by the Chicago Branch and the By-Laws Amendments proposed by the Detroit Branch. Messrs. Manson Glover of the Boston Branch and Robert Guerke of the Baltimore-Washington Branch served on this committee.

An assignment to prepare an index of the Society's publications from 1947 to 1913 was accepted. Shortly after this work was started it was decided to provide a complete reference index for each volume of PLATING. This index, amounting to over 2,500 references, was prepared in time for publication in the February, 1949 issue, but editorial difficulties prevented publication. Plans now are being made to have these references set in type for use as a guide in the preparation of Decennial Indices of our publications.

A task to arrange for the preparation of a new design of Membership Certificates and an Award of Merit was undertaken and will be completed during the year.

I also accepted an appointment as one of the Society's representatives to the National Association of Corrosion Engineers' Inter-Society Corrosion Committee.

All Branches delegated to me were visited with the exception of the Lancaster Branch. Absence from Baltimore on meeting nights prevented attendance at any of the meetings of this branch.

An additional assignment of presenting the charter to the Allentown-Reading Branch was accepted and I had the pleasure of starting this Branch on its active way.

This report would not be complete without a short review of the important milestones which have been passed during my tenure of offices. The organization of the National Office on a business basis; the reorganization and progress of the Research Committee; the change in format of the publications; the improvement in the quality of the technical papers in the monthly publication; the two successful Industrial Expositions; the preparation of a speakers' list for Branch Meetings; the adoption of a new Constitution and By-Laws; the preparation of a recommended course of study at trade school level for ambitious electroplaters; and the development of embryonic plans for a Plater's Handbook are several that illustrate the scope of activities of your Society.

It has been a great pleasure to serve you as a member of the Executive Board. It has required a considerable amount of time, but the Society's progress as measured by the milestones is ample reward for the efforts.

KENNETH M. HUSTON

EXECUTIVE SECRETARY'S REPORT

Graham

This report is for an eleven-month period, from May 1, 1948 to March 31, 1949, since the new fiscal year starts on April 1 under the new Constitution.

INCOME AND EXPENDITURES

The auditor's report for this period on the General Fund of the Society has been reclassified in Table I to show the separate accounts for the Society and its publication, PLATING.

The Society shows a total income of $54,914.97 against total expenditures of $22,510.91. The former under Miscellaneous income includes $23,549.54 received from the 1947 and 1948 Conventions and Industrial Finishing Expositions. Excluding this item, the excess income over expenditures amounts to $8,854.52.

PLATING shows a total income of $83,622.84, including $3,387.45 from subscriptions which is more than double the amount received from subscribers in the previous year. The total expenditures for the Publication were $75,698.88 and the excess income over expenditures amounts to $7,923.96.

Since the above figures are for an eleven-month period, it is not readily apparent what the true picture is. For example, the per capita tax income is for twelve months, whereas the income from sales is for eleven months and the income

RECLASSIFICATION OF ACCOUNTS IN GENERAL FUND

ELEVEN MONTH PERIOD, MAY 1, 1948 TO MARCH 31, 1949

	Society	Plating
INCOME		
Advertising (net)	$	$ 80,235 39
Sales—Plating		3,387 45
Sales—*Proceedings*	769 15	
Sales—Books, Reprints, Branch Supplies	2,128 19	
Interest	649 58	
Per Capita Tax	25,715 80	
Members-at-Large, Dues	960 85	
Miscellaneous	24,691 40	
Totals	$ 54,914 97	$ 83,622 84
(Budget 1948–1949)	($35,600 00)	($74,200 00)
EXPENDITURES		
Plating—Printing, etc.	$	$ 46,854 38
Advertising Manager's Commission		7,085 89
Proceedings	5,328 13	
Books, Reprints, Furniture, Fixtures, Office Equipment and Branch Supplies	2,884 06	
Convention Expenses	1,519 36	
Public Relation Activity	49 11	
Officers' Office Expense	437 59	
Salaries (8 employees)	6,455 10	15,064 90
Officers' Travel Expense	2,007 26	
Advertising Manager's Travel Expense		2,771 02
National Office Expense	3,830 30	3,830 31
New Educational Activities	None	
Uncollectible Accounts	None	95 38
Totals	$ 22,510 91	$ 75,698 88
(Budget 1948–1858)	($35,600 00)	($70,300 00)

April 5, 1949.

THE SUPREME SOCIETY OF
THE AMERICAN ELECTROPLATERS' SOCIETY, INC.
Jenkintown, Pa.

GENTLEMEN:

We have examined the balance sheets of the General Fund and Research Fund of The Supreme Society of The American Electroplaters' Society, Inc., as of March 31, 1949, the related statements of income and expenses of said funds for the eleven months' period from May 1, 1948 to March 31, 1949, and the statement of the Proctor Award Fund for said period. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances, with the exception that we did not confirm the amounts due from dues of members at large.

The accompanying balance sheet and statement of income and expenses of the General Fund are exclusive of certain accounts as more fully described in Notes A and B thereto. Accounts Receivable from Advertising include two accounts aggregating $5,584.19, which are past due and have been placed in the hands of a collection agency. However, the management does not believe that collection effort has proceeded sufficiently to justify considering them as uncollectible at the present time.

In our opinion, the accompanying balance sheets and statements of income and expenses, except as indicated above, and the statement of the Proctor Award Fund present fairly the financial position of The Supreme Society of The American Electroplaters' Society, Inc., as of March 31, 1949, and the income and expenses for the eleven months' period from May 1, 1948 to March 31, 1949.

Very truly yours,

Philadelphia, Pa.,
April 5, 1949

LAWRENCE E. BROWN & COMPANY,
Certified Public Accountants

from the sale of "Proceedings" does not include any income from the 1948 volume as anticipated. Furthermore the Miscellaneous income does not include a transfer of $3,900.00 profit from PLATING as provided in the budget for the corresponding fiscal period.

Similarly, under Expenditures, the amounts indicated for "Proceedings" does not include some additional $4,500.00 budgeted for the 1948 volume which will have to be paid in the current fiscal year. Under "Books," $430.00 was spent for a reprinting of Glasstone's book, not anticipated in the budget, and under "New Educational Activities" of the $2,000.00 appropriated none was spent. Obviously the monthly recurring expenses in a twelve-month fiscal year would be greater by one month than the figure shown.

The Constitution provides that members shall receive PLATING at one-half of the regular subscription price as part of their dues. No transfer (of approximately $10,000.00) has been made from the Society income to the income of PLATING. With such a transfer the Society operations are carried on at a loss.

BRANCH ACTIVITIES

In recent years a number of requests have been received for information about the founders of a Branch, the date of its charter award, its first officers, and other historical data. In some instances the Branches themselves have made such inquiries. Since there was no historical record of this nature available in the office of the Secretary, each Branch was asked to write up a history to supply our needs and to complete our records. To date 21 histories have been received and a few Branches have indicated that they are compiling histories, but the following Branches have not as yet replied: Buffalo, Cincinnati, Dayton, New Haven, Pittsburgh, Rochester, San Francisco, St. Louis, Syracuse, Allentown-Reading*, Louisville*, Western Ontario*, Winston-Salem*. (*recently formed)

There were 279 Branch News items published in PLATING during the past fiscal period representing an average of 6.5 items for each of the 43 active Branches as compared with 6.1 items in the previous year. Since these items serve as a recorded history of the Branches' activities and are required by the Constitution and By-Laws, it is hoped that a further improvement can be shown this year. A comparison for the last two years is shown below.

BRANCH NEWS ITEMS

	1947–48	1948–49
Months	12	11
Branches	39	43
10–18 Items	7	6
5–9 Items	24	24
1–4 Items	5	13
0 Items	3	0

There have been 28 general communications on Society matters sent to the Branches from the office of the Executive Secretary last year, not including the monthly A. E. S. News Letter, which is sent to all Officers and Board members of each Branch. The cooperation of the Branches with the National Office has been excellent and, with but few exceptions, the handling of business matters within the Branches appears to have reached an all-time high for efficiency.

Publications

Favorable comments on the quality and appearance of our monthly publication continue to be received. Our print order has now risen to 7,000 copies for March, 1949. This is largely due to an increase in subscribers from 400 to 742 during the past year and is further proof of the growing appreciation of the value of Plating in the metal finishing industry. Dr. Samuel Glasstone's book, "Fundamentals of Electrochemistry and Electrodeposition", is now being used as a text in some institutions. Since 126 copies were sold during the year and our supply was nearly exhausted, a fourth printing of 500 copies was purchased.

The *Proceedings* of the technical sessions of the 1948 Convention did not appear until April, 1949. While a year in editing and publishing the bound transactions of technical societies is not unusual, some members have indicated displeasure at the delay. The causes, of which there are several, have been fully discussed with the Executive Board, and steps are being taken which, it is hoped, will improve the situation next year.

The selling price of the *Proceedings* for 1946 and 1947 has been reduced to $5.00 per copy. There is still a supply available for any who may wish to purchase them. The 1948 volume is being sold at the same price. Members should be reminded that they receive copies of the *Proceedings* each year as part of their membership dues provided their names are on the Society's mailing list, as members in good standing, prior to August 31 of a given year. Any member joining the Society after August 31 must purchase his copy of the *Proceedings* for the year in question.

The Editorial Board created under the new Constitution and By-Laws completed its first year of operation. It is responsible for soliciting papers for the annual technical sessions as well as for the monthly publication. Under this arrangement duplication of effort and competition for papers by two groups of the same Society is eliminated. As the duties of the Board become more clearly defined and developed, it is confidently expected that its contribution to the advancement of the Society's objectives will be profound. The members of the Society owe the members of the Editorial Board a debt of gratitude for services already rendered during the past year.

Many inquiries have been received during the year. These have been answered directly or referred to members for reply. A number have been published in the Question Box in Plating.

Acknowledgment

The personnel of the National Office has not changed since last year. Their contributions to the successful operation of the Society are gratefully acknowledged.

A. K. Graham

RESEARCH COMMITTEE CHAIRMAN'S REPORT

Weisberg

In view of the fact that the date for submitting reports has been advanced this

FINANCIAL STATEMENT OF THE SUPREME SOCIETY OF THE AMERICAN ELECTROPLATERS' SOCIETY, INC.

General Fund

BALANCE SHEET, MARCH 31, 1949

ASSETS		
Demand Deposit, Jenkintown Bank and Trust Company		$39,531.58
Petty Cash		25.00
Time Deposits:		
American National Building & Loan Association, Baltimore, Md.	$ 5,000.00	
Augusta Building and Loan Association, Baltimore, Md.	$ 5,000.00	
Aurora Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Peoples Federal Savings and Loan Association, Detroit, Mich.	5,000.00	
Progress Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Savings Fund Society of Germantown, Philadelphia, Pa.	5,000.00	
Standard Savings and Loan Association, Baltimore, Md.	5,000.00	
Standard Savings and Loan Association, Detroit, Mich.	5,000.00	
Suffolk County Federal Savings and Loan Association, Babylon, N. Y.	5,000.00	
Surety Savings and Loan Association, Detroit, Mich.	5,000.00	50,000.00
Accounts Receivable:		
Advertising, Subscriptions, Books and Reprints	9,259.02	
Members at Large	532.10	9,791.12
Deposit with Bell Telephone Company		200.00
Deposit with Copyright Office		44.00
Total Assets (Note A)		$99,591.70
LIABILITIES AND FUND		
Liabilities:		
Pay Roll Taxes withheld from employees	490.40	
Advance Payments	869.41	
Total Liabilities		$ 1,359.81
General Fund:		
Balance, May 1, 1948	$57,903.87	
Add: Excess of Income over Expenses for the eleven months from May 1, 1948 to March 31, 1949, as annexed	40,328.02	
Balance, March 31, 1949		98,231.89
Total Liabilities and Fund (Note A)		$99,591.70

Note A: Exclusive of inventories of publications, literature and supplies, office furniture and equipment, accounts payable and prepaid and accrued expenses.

year, this report covers the activities of the Research Program for the ten-month period beginning May 1, 1948 and ending February 28, 1949.

Active experimental work has been carried on during this period on eight projects, as follows:

No.	*Title*
2	Determination of Impurities in Electroplating Solutions
4	Effect of Surface Finishing of Non-ferrous Base Metals on the Protective Value of Plated Coatings
5	Effect of Impurities and Purification of Electroplating Solutions
6	Nature and Effect of Porosity in Electrodeposits
7	Methods for Testing Thickness of Electrodeposits
9	Physical Properties of Electrodeposited Metals
10	Disposal of Plating Room Wastes
11	Current and Metal Distribution in Electroplating

General Fund

STATEMENT OF INCOME AND EXPENSES FOR THE ELEVEN MONTHS' PERIOD FROM MAY 1, 1948 TO MARCH 31, 1949

INCOME			
Advertising		$93,171.38	
Less: Discounts allowed	$ 1,401.81		
Agency commission	11,534.18	12,935.99	$ 80,235.39
Sales			
Monthly Publications		$ 3,387.45	
"Proceedings"		769.15	
Glasstone Book		295.81	
Books and Reprints		1,689.38	
Branch Supplies		143.00	6,284.79
Per Capita Taxes Levied			25,715.80
Foreign Membership Dues Levied			960.85
Interest on Investments			649.58
Miscellaneous (Including $12,804.61 profit from 1947 convention and $10,744.93 profit from 1948 convention			24,691.40
Total Income			$138,537.81
EXPENSES			
Commission, Advertising Manager			$ 7,085.89
Monthly Publications			44,520.75
"Proceedings"			5,328.13
Copyright Expense			42.00
Books and Reprints			1,190.21
Glasstone Book			429.80
Branch Supplies			304.27
Convention			1,519.36
Salaries			21,517.00
Traveling Expenses			
Executive Secretary	$ 530.35		
Advertising Manager	2,771.02		
Officers	1,476.91		4,778.28
Furniture and Fixtures and Office Equipment			959.78
Officers' Office Expense			437.59
Public Relations Committee Expense			49.11
Secretary's Office Expense			9,952.24
Uncollectible Accounts			95.38
Total Expenses (Note B)			$ 98,209.79
SUMMARY			
Total Income			$138,537.81
Total Expenses			98,209.79
Excess of Income over Expenses (Note B)			$ 40,328.02

NOTE B: The expenses reported do not take into account the changes during the period in inventories of publications, literature and supplies, office furniture and equipment, accounts payable and prepaid and accrued expenses.

In addition, a special Project Committee has been appointed to make plans for Project No. 12, which is to be a study of Cleaning and Preparation of Metals for Electroplating.

STATUS OF INDIVIDUAL PROJECTS

No. 2. Experimental work on methods for the determination of various metallic impurities in nickel and copper baths has been completed. Work on zinc baths is under way. Methods developed in this project have been checked by other laboratories before publication, in every case. This policy makes for some delay in publication but insures against errors and misunderstandings. Reports indicate that these methods are gaining acceptance in the plating industry and finding occasional application in other fields as well.

No. 4. Experimental work was concluded in December. Panels are ready for outdoor exposure and will be put out in late spring or early summer in accordance with cooperative arrangements with A. S. T. M. Committee B-8.

No. 5. Experimental studies on the effect of copper in nickel solutions have disclosed a hitherto unsuspected adverse effect of copper on salt spray resistance. Methods for removing copper have been given careful study. A similar investigation is now under way on zinc in nickel baths. In view of its importance, this project has been speeded up by adding a second Fellow. Analytical methods developed in Project No. 2 are an essential tool in the work of Project No. 5.

No. 6. Two types of open structure in electrodeposits have been found to exist. One is the gross porosity, which is more or less accidental, since it is associated with inclusions of dirt, etc., and can be avoided for the most part at least by filtration of the plating solution. The other is the intrinsic porosity of the electrodeposit, which is characteristic of the particular metal, the thickness of the metal, and to some degree of the conditions under which the metal is deposited. Up to now, intrinsic porosity has been measured by determining the permeability to air of an electrodeposited foil obtained either by plating on stainless steel and separating the plate or by plating on some basis metal that can be dissolved without damaging the plate. The results for any given metal can be expressed by a number characteristic of that metal, although the air flowing through the foil has been varied as much as 10,000 fold. It has been established that the permeability varies for different gases with the square root of the molecular weight and it is hoped in this way to estimate the size of the openings. An ingenious method for studying adherent deposits on iron is being investigated. Equipment for electron diffraction studies has been set up. This will be used in studying the structure of deposits as well as in the application of the per-

mcability technique to corrosion studies. The outstanding importance of this project has caused the Research Committee to add a second Fellow, who began work in August.

No. 7. This project has suffered a number of delays due to circumstances beyond our control. The end of these difficulties now appears to be in sight, and there is reason to hope that the rate of progress from now on will be satisfactory. Several important developments with respect to thickness measurements have been uncovered, but it is deemed advisable not to report these until they have been confirmed by further investigation.

No. 9. It is expected that the investigation of the physical properties of electrodeposited nickel, which is now under way, will be completed in June. Publication of the results of this comprehensive research may, therefore, be possible before the end of the summer. The next assignment in view for this project is a similar study of the physical properties of electrodeposited copper.

No. 10. The disposal of plating room wastes is a problem which is becoming increasingly important to industry. Since the funds available for each project are limited, it has been necessary to limit experimental work to one type of waste at a time. The first to be studied are cyanide wastes. A critical review of the literature on cyanide wastes and a bibliography covering all types of wastes have been published. The need for a quick method of determining minute quantities of cyanide in these wastes opens up a field for cooperation between Projects No. 2 and No. 10.

No. 11. Experimental work on this new project began in November at Evansville College with Dr. John Kronsbein as Project Director. Dr. Kronsbein's practical experience in problems involving current and metal distribution together with his facility in handling the mathematical theory makes him unusually well fitted to undertake this project.

No. 12. The Research Committee has received numerous suggestions for a project on cleaning. The delay in setting up such a project stems from no reluctance on the part of the Committee but from the difficulties of formulating an approach that would lead to a fundamental advance in our knowledge and of finding a qualified Project Director. The able and energetic committee looking after this matter appears to be making good progress.

Publications

Seven research papers and four progress reports were published in PLATING during the period covered by this report. In addition, a bibliography on "Disposal of Plating Room Wastes" was published as a separate Research Report (No. 9) but did not appear in PLATING on account of its length. At present, four papers are in the hands of the Editor (one of these

Research Fund

BALANCE SHEET, MARCH 31, 1949

ASSETS		
Demand Deposit, Abington Bank and Trust Company		$15,843.81
United States Treasury 2% Bond due September 15, 1953 (Quoted Market Value $5,062.50)		5,000.00
Time Deposits:		
Atlantic Federal Savings and Loan Association, Baltimore, Md.	$5,000.00	
Baltimore Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Birmingham Federal Savings and Loan Association, Birmingham, Mich.	5,000.00	
First Federal Savings and Loan Association, Waterbury, Conn.	5,000.00	
First Federal Savings and Loan Association, Detroit, Mich.	5,000.00	
Liberty Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Loyola Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
The Philadelphia Savings Fund Society, Philadelphia, Pa.	5,000.00	40,000.00
Accounts Receivable, Reprints		20.72
Total Assets		$60,864.53
LIABILITY AND FUND		
Liability		
Payroll Taxes deducted from employees		$ 30.50
Research Fund:		
Balance, May 1, 1948	$64,769.35	
Deduct:		
Excess of Expenses over Income for the eleven months from May 1, 1948 to March 31, 1949, as annexed	3,935.32	
Balance, March 31, 1949		60,834.03
Total Liability and Fund		$60,864.53

Research Fund

STATEMENT OF INCOME AND EXPENSES FOR THE ELEVEN MONTHS' PERIOD FROM MAY 1, 1948 TO MARCH 31, 1949

INCOME		
Sustaining Membership Dues and Subscriptions	$24,890.05	
Income from Investments	1,006.31	
Sale of Reprints	295.46	
Miscellaneous	.05	
Total Income		$26,191.87
Salaries of Project Directors and Fellows	$15,488.42	
Project Payments to Institutions	10,613.14	
Cost of Reprints	1,076.68	
Supplies	491.99	
Office Expense	30.39	
Per Capita Tax, Sustaining Members paid to General Fund	1,137.40	
Miscellaneous	1,286.47	
Uncollectible Accounts	2.70	
Total Expenses		30,127.19
Excess of Expenses over Income		$ 3,935.32

has appeared in the March issue); five more papers are in various stages of Committee consideration, while six others are being written. Three of the last represent papers scheduled for the Research Session at the Milwaukee Convention. When other papers in prospect are taken into account, it appears that a steady flow of research papers should be available for PLATING during the coming year. This is not always easy to arrange, because on the one hand there is nearly always a considerable gap between research accomplishment and the time when a paper can be made ready for publication while research accomplishment on the other hand does not always flow along smoothly enough to insure the steady flow of papers that the Editor would like to receive.

Research papers are necessarily technical in character. While every effort is being made to present the results in a simple and straightforward manner they must still be on a high technical level. As a result many members of the Society who have not had the advantage of technical training undoubtedly find some of these papers difficult to read. There is a need therefore for supplementary papers at the "educational" level to make the results available to those who do not find the technical papers to their liking.

The Research Committee has been aware of this need and has given the matter considerable thought. The difficulty is in finding someone qualified to write such papers. Some Project Directors can, some cannot. It is hoped to have some papers of this type as a result of these discussions.

PUBLICITY

A number of releases featuring research results, activation of projects, and employment of new personnel have been sent to the technical press, which has given them wide publicity.

Publication of technical papers is, of course, another form of publicity for the Research Program. Essential to its financial success is also to put these results into a form that can be understood and appreciated by those who control the purse strings. In my judgment, this has been the weakest spot in the work of the Research Committee, in all probability because most members of the Committee have been research-minded rather than public relations-minded. However, the Committee has acquired a much better understanding of this problem during the past year and I look forward to better results as this understanding is put into effect.

LOUIS WEISBERG.

Hermanie Dorothea and Charles H. Proctor Award Fund

FOR THE ELEVEN MONTHS' PERIOD FROM MAY 1, 1948 TO MARCH 31, 1949

Balance, May 1, 1948		$150.00
Awards made during the period	$100.00	
Balance transferred to General Fund	50.00	150.00
Balance, March 31, 1949		None

Award Fund closed.

RESEARCH COMMITTEE 1948-49

Dr. Louis Weisberg, *Chairman*
Consultant, New York City

Dr. R. A. Schaefer, *Vice-Chairman*
Cleveland Graphite Bronze Company

Mr. B. C. Case
Hanson-Van Winkle-Munning Company

Dr. H. L. Kellner
Leo Manufacturing Company

Mr. N. E. Promisel
Bureau of Aeronautics, Navy Dept.

Mr. H. J. Struckhoff
Lasalco, Inc.

Mr. William M. Tucker
Eastman Kodak Company

Mr. Leonard E. Weeg
National Lock Company

Dr. W. A. Wesley
The International Nickel Company

Dr. William Blum, *Honorary Member*
National Bureau of Standards

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Mr. S. S. Johnston, *A. E. S. President*
Weirton Steel Company

Dr. A. K. Graham, *A. E. S. Executive Secretary*
Graham, Crowley and Associates, Inc.

LIAISON MEMBERS

Dr. H. J. Creighton
Representing Electrochemical Society
Swarthmore College

Mr. C. H. Sample
Representing A. S. T. M.
The International Nickel Company

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Dr. H. L. Kellner, *Chairman*
Leo Manufacturing Company

Mr. J. J. Duffy, Jr., *Vice-Chairman*
Pennsylvania Salt Manufacturing Company

Mr. Clyde Kelly, *Vice-Chairman*
Driscoll Company

Mr. H. J. Struckhoff, *Vice-Chairman*
Lasalco, Inc.

RESEARCH DIRECTING SUB-COMMITTEE

Mr. William M. Tucker, *Chairman*
Eastman Kodak Company

Mr. B. C. Case, *Vice-Chairman*
Hanson-Van Winkle-Munning Company
(Projects Nos. 5, 8 and 11)

Dr. C. F. Gurnham, *Vice-Chairman*
Tufts College
(Projects Nos. 2, 4 and 10)

Dr. W. A. Wesley, *Vice-Chairman*
The International Nickel Company
(Projects Nos. 6, 7 and 9)

PUBLIC RELATIONS COMMITTEE CHAIRMAN'S REPORT

Clarin

Since the last report was made, the Committee has sent seven news releases to the daily or technical press. They include three items pertaining to the Atlantic City Convention and Industrial Finishing Exposition, one item dealing with future Conventions, and three items of news of A. E. S. Research.

D. N. CLARIN

SUSTAINING MEMBERSHIP LIST

As of MAY 1, 1949

(Figures in parenthesis indicate number of memberships held.)

Acme Galvanizing, Inc.
Acme Manufacturing Company
Acme Plating Company, The
Acme Steel Company
Advance Plating Company, The
Alsop Engineering Corporation
Aluminum Company of America
American Brass Company
American Buff Company
American Can Company
American Chemical Paint Company
American Emblem Company
American Hot Dip Galvanizers' Association, Inc.
American Instrument Company
American Radiator and Standard Sanitary Corporation
American Smelting & Refining Company
American Wire Fabrics Corporation
American Zinc Institute (5)
Apex Plating Company
Apothecaries Hall Company
Ardco, Incorporated
Armco Steel Corporation
Arrow-Hart and Hegeman Electric Company
Auto City Plating Company
Automotive Rubber Company

M. E. Baker Company
Bastian-Blessing Company, The
Belke Manufacturing Company
Bell Telephone Laboratories, Inc.
Berteau-Lowell Plating Works
Bethlehem Steel Company (2)
Blakeslee, G. S., & Company
Brown & Bigelow
Brown-Hutchinson Iron Works
Buckingham Products Company (2)

Canadian Hanson & Van Winkle Company, Limited
Casco Products Corporation
Chase Brass & Copper Company
Chemical Corporation, The
Chicago Electro-Platers Institute
Christie Plating Company
Chrome-Rite Company (2)
Chromium Corporation of America
Chromium Process Company, The
Chrysler Corporation (2)
Cinch Manufacturing Corporation
Cleveland Graphite Bronze Company, The
Clinton Company, The
Codman, F. L. & J. C. Company
Corona Corporation
Cowles Chemical Corporation
Croname, Incorporated
Crown Cork and Seal Company
Crown Rheostat and Supply Company

Dalco Corporation
Davies Supply & Manufacturing Company

(Continued on page 614)

RESEARCH PROJECTS

Project No.	Title	Location	Project Director and Assistant	Project Directing Sub-Committee	Year Accepted
2	*"Determination of Impurities in Electroplating Solutions"*	Lehigh University	Prof. E. J. Serfass Mrs. Mary Perry (Fellow)	Dr. D. G. Foulke, Chairman, Hanson-Van Winkle-Munning Co. Dr. W. R. Meyer, The Enthone Co. Dr. Henry B. Linford, Columbia Univ.	1944
4	*"Effect of Surface Finishing of Non-Ferrous Base Metals on Protective Value of Plated Coatings"*	U. S. Time Corp., Middlebury, Conn.	Dr. George J. Kahan	Mr. M. R. Diggin, Chairman, Hanson-Van Winkle-Munning Co. Mr. E. A. Anderson, New Jersey Zinc Co. Mr. A. W. Tracy, The American Brass Co.	1947
5	*"Effects of Impurities and Purification of Electroplating Solutions"*	Michigan State College	Prof. D. T. Ewing Mr. Robert Romiński (Assistant) Mr. Donald D. Clark (Assistant)	Mr. G. M. Cole, Chairman, Transteel Div., General Motors Corp. Mr. L. B. Sperry, Doehler-Jarvis Corp.	1945
6	*"The Nature and Effect of Porosity in Electrodeposits"*	Princeton University	Dr. N. Thon Dr. L. Yang (Fellow) Mr. D. S. Kelemen (Assistant)	Dr. W. A. Wesley, Chairman, International Nickel Co. Dr. R. Egeberg, International Silver Co. Mr. A. Mendizza, Bell Telephone Lab., Inc.	1946
7	*"Methods for Testing Thickness of Electrodeposits"*	Pennsylvania State College	Prof. H. J. Read F. R. Lorenz (Assistant)	Dr. R. M. Wick, Chairman; Bethlehem Steel Co. Mr. J. Mazia, Chairman; American Chemical Paint Co. Mr. A. H. du Rose, Harshaw Chemical Co.	1946
9	*"Physical Properties of Electrodeposited Metals"*	National Bureau of Standards	Dr. A. Brenner Dr. Victor Zentner (Research Associate)	Dr. W. Blum, Chairman; National Bureau of Standards Mr. C. H. Sample, International Nickel Co. Mr. N. Promisel, Bureau of Aeronautics, Navy Department	1947
10	*"The Disposal of Plating Room Wastes"*	Yale University	Prof. H. F. Dodge Mr. D. C. Reams (Assistant)	Dr. C. F. Goodeve, Chairman; Tufts College Mr. W. H. Huey, E. I. du Pont de Nemours & Co. Mr. M. A. Orr, International Silver Co.	1947
11	*"Current and Metal Distribution in Electroplating"*	Evansville College	Prof. J. Kronsbein	Dr. R. A. Schaefer, Chairman, Cleveland Graphite Bronze Co. Dr. Harold J. Wiesner, Bendix Products Div., Bendix Aviation Corp. Mr. Leonard E. Woog, National Lock Co.	1948
12	*"Cleaning and Preparation of Metals for Electroplating"*	Being negotiated		Dr. Herbert Bondon, Chairman; Sylvania Electric Prod., Inc. Dr. Donald Price, Oakite, Inc. Dr. Edw. A. Parker, Technic, Inc.	1948

(Continued on page 614)

RESEARCH PROJECTS

Project No.	Title	Location	Project Director and Assistant	Project Directing Sub-Committee	Year Accepted
13	*"Internal Stress in Electrodeposits"*	Being negotiated			

BRANCH SUBSCRIPTIONS TO RESEARCH FUND

Baltimore-Washington Branch	$ 176.25
Bridgeport Branch	39.00
Chicago Branch	441.00
Cleveland Branch	190.00
Dayton Branch	76.00
Detroit Branch	719.00
Pittsburgh Branch	125.00
Providence-Attleboro Branch	109.00
Rochester Branch	200.00
St. Joseph Valley Branch	70.00
Toronto Branch	144.00
Total	$2,290.05

SUBSCRIBER TO RESEARCH FUND

Speakman Company

Have you investigated to determine how much you can save on production costs by using the new Paste rack insulation? Bunatol No. 1000 Paste will give maximum insulation life at minimum cost per rack. Prove this by running a test rack.

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NELSON J. QUINN COMPANY

TOLEDO 7, OHIO

SUSTAINING MEMBERSHIP LIST

Daystrom Corporation
Detrex Corporation
Detroit Edison Company, The
Dixie Electro Plating Company
Doehler-Jarvis Corporation (2)
R. R. Donnelley & Sons Company
E. I. du Pont de Nemours & Company (2)
Dura Company
Dura-Chrome of Chicago, Inc.

Eastman Kodak Company
Enton Chemical & Dyestuff Company
Enton Manufacturing Company
Electric Auto-Lite Company, The (2)
Electrolux Corporation
Ellmore Silver Company, Inc.
Enthone, Inc.
Erie Plating Company

John H. Feeley
Finishing Publications, Inc.
Ford Motor Company (5)
Formax Manufacturing Company
Frigidaire Division, General Motors Corporation

Gemex Company
General Electric Company
General Motors Corporation (5)
Gerity-Michigan Corporation
Gillette Safety Razor Company
Gorham Manufacturing Company
Graham, Crowley & Associates, Inc.
Graham Plating Works
Great Lakes Plating Company
W. Green Electric Company
Frederick Gumm Chemical Company (2)

Hamilton Watch Company
Hammond Machinery Builders, Inc.
A. H. Hannon
Hanson-Van Winkle-Munning Co. (3)
Harshaw Chemical Company, The (3)
Haviland Products Company
Heil Process Equipment Corporation
Houdaille-Hershey Corporation (3)
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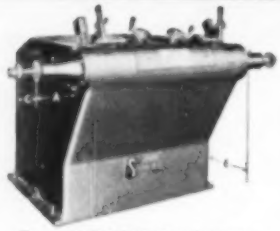

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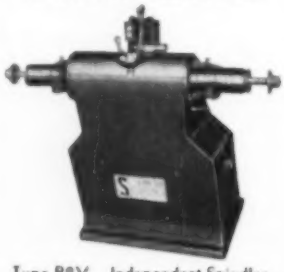

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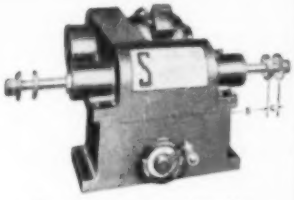

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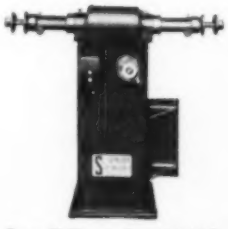

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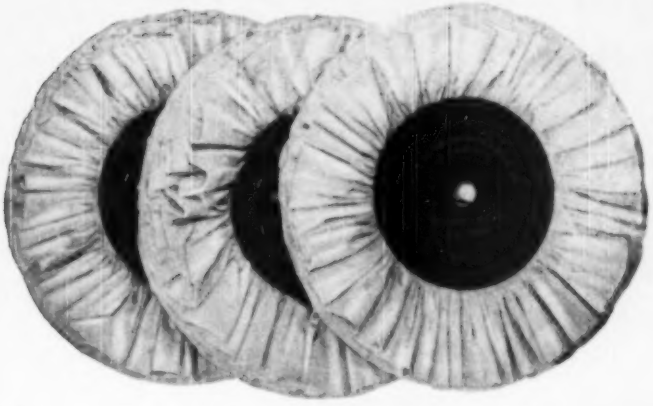

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Article Abstracts

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Production of Extremely Thin Metal Films by Evaporation onto Liquid Surfaces. N. Hast. Nature **162**, 892 (December 4, 1948).

In a new method recently devised for making thin metal films a small amount of beryllium or aluminum was evaporated in a vacuum onto a liquid surface. It is specified that the liquid had to have a high boiling point and low vapor pressure at room temperature. Glycerol was the chief liquid used, and each step of the procedure used in making metal films on the surface of this liquid is outlined. One of the greatest advantages of the new method compared with the old, in which small amounts of beryllium or aluminum were evaporated on the surface of a film of cellulose nitrate, etc. [Nature (March 15, 1947)] is that in the making of metal films for use in electron microscopy it is possible to lay a metal film directly on an organic substance without using amyl acetate or other liquids which affect organic substances. The author gives a brief report on evaporating metals onto vacuum oil surfaces, and aluminum metal in a vacuum onto a mercury surface. In the case of the latter, the normal reaction which results when mercury and aluminum are put into contact with each other did not take place when the action occurred in a vacuum.

Safe Disposal of Waste Solutions from Electroplating Shops. H. Krause. Fertigungstechnik **2**, No. 7 (1944): Henry Brutcher, Altadena, Calif., Technical Translation No. 1912.

Detailed description is given of various practical methods of treating and detoxicating pickle liquor from smaller plants (killing, settling basins, requisite dilution, recovery of copper, etc.), spent chromium plating baths (toxicity of chromic acid and its salts, best method of rendering such baths harmless on basis of titrimetric determination of chromate content), and potassium cyanide-containing baths (hazards to be

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"Packaged Power" means decentralized power—with one package to power one tank at the voltage you want without rheostat losses. Each package contains its manual control and one to four rectifiers. To meet changing production needs, rectifiers may be grouped in parallel for heavy current loads or in series for higher voltages. Additional rectifiers can be added or the entire package can be shifted easily, quickly.

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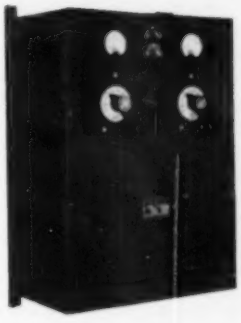

MANUAL CONTROL—Together with "stop" and "start" buttons, volt and ammeter, this control has a "coarse" and a "fine" switch which make 36 steps on a 230-volt system and 60 steps on a 440-volt system. Changes can be made "on load", without current interruptions. One manual control handles one to four rectifiers.

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avoided, conversion of cyanide to Prussian blue, aeration of baths in basins, addition of oxidizing agents).

The Growth and Structure of Thin Oxide Films on Aluminum. G. Hass. Zeit. anorg. Chemie **254**, 96–106 (September, 1947).

Electron diffraction, the electron microscope, and Drude's polarization method were used to investigate the thickness and structure of the above films and the effect of temperature on the rate of oxidation of aluminum. Electrolytically produced aluminum oxide foil was found to change at 700° C (1292° F) from the amorphous into the crystalline state. Data are charted and tabulated and several X-ray diffraction patterns are shown.

The Surface Appearance of Polished Metals—Physical and Psychological Considerations. G. E. Gardam and J. F. Mills. J. Electrodepositors' Tech. Soc. **24**, 47–76 (1949).

A rationalization of the pleasing appearance of polished metals, with suggestions for future research. The quality of a polished metal surface is said to depend on surface trueness (perfect uniformity of the plane or curved surface) and on the absence of surface imperfections such as scratches, pits, or haze. Metal polishing operations are divided into three main divisions: surface trueing, surface flowing, and haze removal.—LYMAN B. SPERRY.

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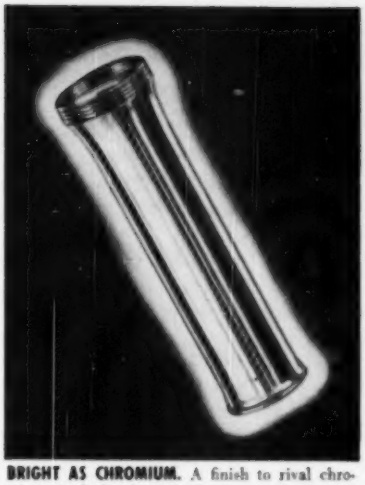
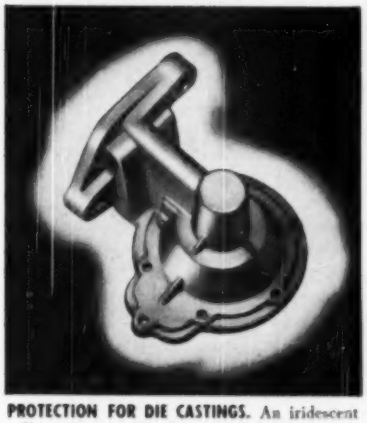
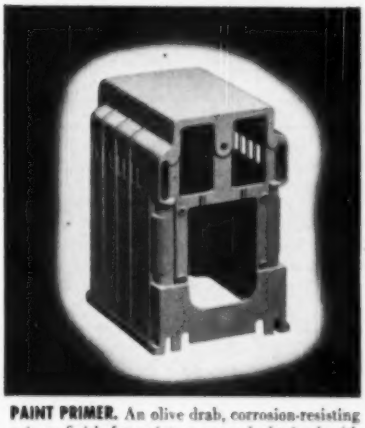


BRIGHT AS CHROMIUM. A finish to rival chromium in looks, beat it for rust resistance, is produced on zinc plated steel.



PROTECTION FOR DIE CASTINGS. An iridescent yellow protective finish on die castings or zinc coatings is also produced with Unichrome Dip Compound 95 at lower concentration.



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You can now forget about high costs in finishing low-cost products. For you get any one of these three attractive, economical finishes by treating zinc in a solution of Unichrome Dip Compound 95.

The coatings this chemical treatment produces actually become an integral part of the zinc. They not only save you money, but in some ways are superior to the finishes they can replace. They increase rust resistance! They step up corrosion protection! All three grip paints and lacquers tightly!

With zinc more plentiful today than chromium, nickel and cadmium — and costing so much less — why not investigate Unichrome Compound 95? After you've tried it, you'll be wanting it for many products — especially after you see the quality of the finishes it provides. Write for more information.

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- Produce on zinc plate a chromium-bright finish that stays bright. Can be soldered.
- Put a bluish clear, or iridescent yellow, or olive drab finish directly on zinc base die castings which will bar "white" corrosion.
- Greatly increase the protection afforded by galvanizing — with a bright spangled finish or an olive drab one.
- Prime *all* zinc surfaces for paint, enamel, or lacquers.

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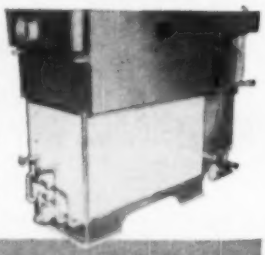

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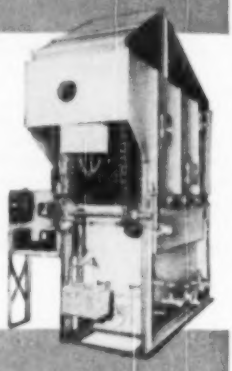

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Avoid the pitfalls of improper degreasing methods. There are metal cleaning problems which are solved by methods other than degreasing. We shall inform you frankly and thoroughly of the methods best suited to your operations. Our long experience is ready to help you do a finer, faster cleaning job. Write today for information on your degreasing operation.

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Patent Abstracts

By GEORGE B. HOGABOOM

Consultant, New Britain, Conn.

Copies of patents may be obtained by writing to Commissioner of Patents, Washington 25, D.C. Price 25 cents each.

No. 2,462,615, February 22, 1949—Method of Chromium Plating and Treating Steel Airplane Propellor Blades—George Dubpernell, assignor to United Chromium, Incorporated.

The desirability of chromium plate on steel aeroplane propellors has been well recognized and chromium plated steel propellors were put into use. After numerous accidents due to the failure of such chromium plated propellors (a frequent occurrence was the breakage of the propellor blade while in flight) the use of chromium plated propellors was discontinued and in fact prohibited by many users. Investigation showed that the failure of chromium plated steel propellors was due to the lowering of fatigue strength of the blade and that breakage started along the cracks in the chromium surface.

CLAIM 1. In a method for reducing the loss of fatigue strength of steels for aeroplane propellor blades consequent upon electrodeposition of chromium protective coatings thereon, passing plating current from an anode to said steel part, as cathode, immersed in a cold aqueous bath below 40° C containing from 500 g/l upward to saturation of chromic acid (CrO^3) and sulfate catalyst acid radicals, the ratio between the chromic acid and the sulfate catalyst acid radical being between 230 to 1 and 160 to 1, electrodepositing from approximately 0.0005 to 0.001 inch chromium and heat treating the plated steel parts to relieve stresses in the plated steel part.

CLAIM 2. A method according to Claim 1, wherein the ratio between the chromic acid and the sulfate catalyst acid radical is approximately 185 to 1.

References cited: U. S. Patents 1,329,735; 1,581,188; 1,802,463; 1,963,391; 2,172,344. Trans. Electrochem. Soc. 58, 89-93 (1930).

We have available for installation at our plant a complete full automatic Stevens barrel plating unit capable of producing plated finishes in large volume. Our facilities are also available for stamping and fabricating small parts requiring barrel plated finishes. If your product is such that stamping, fabricating and plating are required, they can all be done economically at our plant.

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Cut plating costs with this new, flexible plastic tape

This tough, pressure-sensitive tape has no equal for quick, economical masking of pieces to be electroplated. Other uses for plastic-backed "SCOTCH" Electroplating Tape include the insulation of exposed pipes or fittings against corrosive fumes or vapors, or making moisture and vapor proof seals for cans or containers.

Sound like "SCOTCH" Electroplating Tape No. 470 can help you? Write, and tell us the job you want it to do. We'll send a sample along with suggestions for its use. No obligation. Address Dept. P-6.

QUICK FACTS
about "SCOTCH" Electroplating Tape No. 470

- FAST—on at a touch, whisks off cleanly when job's done.
- MANY USES—stops off parts during plating, insulates plating racks, repairs breaks in rack insulation.
- STRETCHY—conforms snugly to uneven and irregular surfaces.
- STRONG ADHESIVE—clings tightly to surfaces, does not allow cleaners or plating solutions to creep under tape.
- TOUGH—plastic backing withstands cleaners, hot or cold, remains pliable under long immersion in plating solutions.

REG. U.S. PAT. OFF.
SCOTCH BRAND
Electroplating Tape No. 470

ANOTHER 3M PRODUCT

Made in U. S. A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn.
General Export: DUREX ABRASIVES CORP., New Rochelle, N. Y.
In Canada: CANADIAN DUREX ABRASIVES LTD., Brantford, Ontario

USE READER SERVICE CARD; INDICATE A 458.

CUT—

DIE CAST PLATING

—REJECTS

25% to 40%

with

MAC BOND

- Throws plate into blind holes
- Prevents discoloration of metal
- Better adhesion of plate
- Easier to control than acid
- Reduces plating time
- Extremely economical
- Unusual detergency properties

More than one plater has had his eyes opened—when he gave MAC BOND an actual on-the-job test and discovered for himself the various outstanding advantages MAC BOND will give him . . . consistently . . . job after job.

Besides producing 25% to 40% reduction in die-cast plating rejects—due to faulty preparation of metal prior to plating—MAC BOND produces many other cost-cutting advantages, seven of which are listed above. And, in addition to die cast plating, MAC BOND is equally effective in the preparation of ferrous and non-ferrous metals as well.

Find out what MAC BOND can do—for you. Send for Facts and Data sheet right now. No obligation, of course.

MACCO PRODUCTS CO.

525 W. 76th STREET
CHICAGO 20, ILLINOIS

No. 2,464,889, March 22, 1949—Process for Making Electrolytic Iron—R. D. Pike and J. Schoder, assignors to Tacoma Powdered Metals Company, Inc.

CLAIM 7. In a method of producing granular brittle electrolytic iron in a nondiaphragm electrolytic cell with an insoluble anode by electrodepositing iron on a cathode in said cell from an aqueous iron chloride electrolyte in contact with both said anode and said cathode, the steps which comprise maintaining said electrolyte at a temperature of about 85 to 90° F, removing electrolyte from one portion of said cell having a total iron content between approximately 10 per cent and 12 per cent of the removed electrolyte by weight, a ferric iron content between approximately 0.75 per cent and 1.5 per cent, and a *p*H between approximately 1.2 and 1.5, contacting iron with a portion of said removed electrolyte to reduce the ferric iron content thereof to below approximately 0.05 per cent while increasing the ferrous iron content and the *p*H and producing a precipitate of ferric oxychloride, discontinuing the contacting with iron when the *p*H of the resulting solution is between approximately 1.9 and 2.1, acidifying the resulting solution with hydrochloric acid to dissolve said precipitate and produce a *p*H between approximately 1.3 and 1.4, thereafter contacting iron with the acidified solution to increase the *p*H to between approximately 2.0 and 2.15 and increase the ferrous iron content without forming a precipitate to form a regenerated ferrous chloride solution, mixing the regenerated solution with another portion of said removed electrolyte to provide a ferric iron content above approximately 0.4 per cent and said total iron content, and returning the same to said cell.

Cathodic current density	50.5 asf
Anodic current density	50.0 asf
KW-hours per pound of iron deposited measured at cells	3.07
Commercial hydrochloric acid containing 31.52 per cent HCl consumed per pound of iron deposited	0.85 lb

7 claims, 3 figures.

References cited: U. S. Patents 552,415; 1,254,056; 1,432,544; 1,769,605; 1,782,909; 1,912,430; 1,845,107; 1,980,381; 2,223,928; 2,273,798. British Patents 506,590; 594,954.

CHROMIC ACID

FIBER CHEMICAL CORPORATION

Chemical Manufacturers

Mailing Address: P. O. Box 218, Matawan, N. J.

Telephone: Matawan 1-1818

Factory: Cliffwood, New Jersey

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McKeon's Zinc-Brite

Constantly purifies your zinc plating solution. Prevents harmful build-up of carbonates.

Enjoy Trouble-free Operation

Simple, efficient, economical

Sulphur Products Co. Inc.
Greensburg Pa.

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FOR

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MARCO No. 112

FOR

BURNISHING ALUMINUM

Trial size gallon can

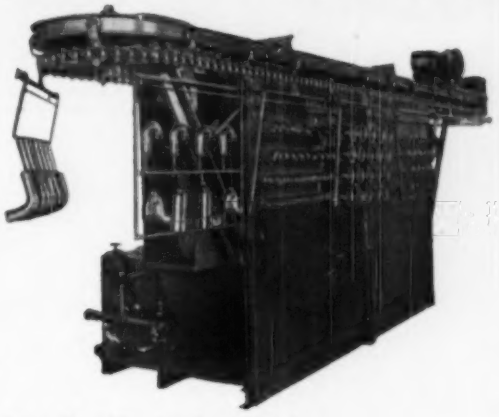
$2.75 delivered

●

M & M CHEMICAL CO.

P. O. Box 172, Willimantic, Conn.

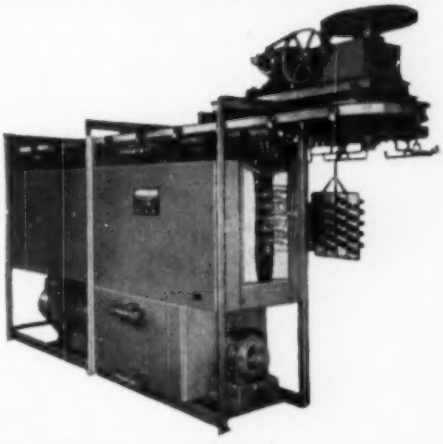
. . . for Plated Parts
TRIPOLI REMOVER



for automatic cleaning prior to plating or lacquering

- Washes and rinses with powerful sprays of hot solution.
- Removes tripoli and buffing compound quickly and thoroughly.
- No hand wiping to remove smut.

SPOTLESS DRYER



for automatic drying without water spotting

- May be furnished to fit right in the plating line.
- Produces spotless work.
- No hand wiping to remove water stains.

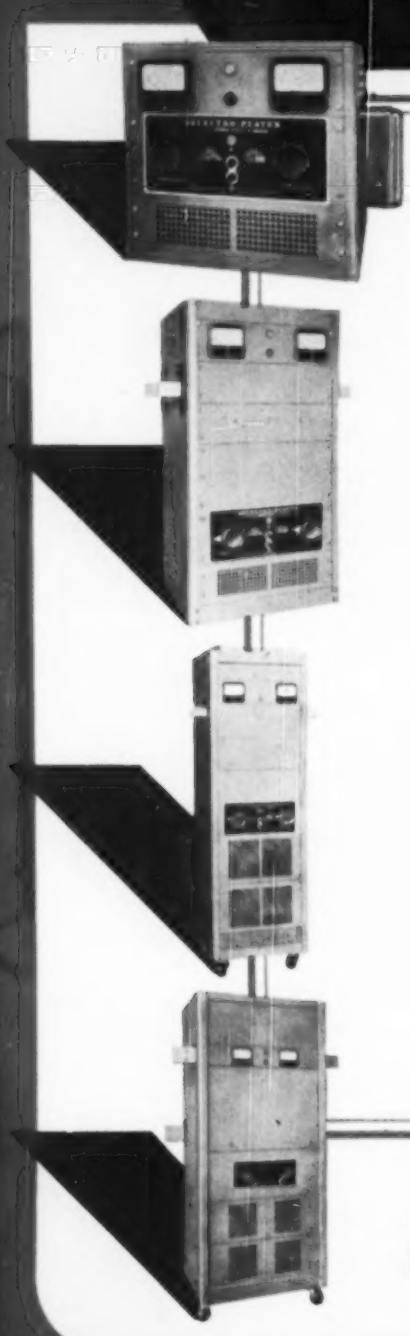
For further information write to

METALWASH MACHINERY CORP.

149-155 Shaw Ave. Irvington 11, N. J.

USE READER SERVICE CARD; INDICATE A 463.

The Most Complete Line of



SELECTRO-PLATERS

The Selectro-Plater line (the original selenium rectifier for electroplating) includes over two hundred standard types ranging in capacity from 50 amperes to 5,000 amperes and in maximum voltage ratings from 6 volts to 60 volts. These units are available in three forms—basic, standard and remote control, and are used to supply D.C. power for full scale production, electroplating, anodizing, etc.

Only a few units are shown on this page. The complete line of standard units and the exclusive Green features are described in the twelve page Selectro-Plater Book—Fourth Edition—available on request from Green Electric or its representatives.

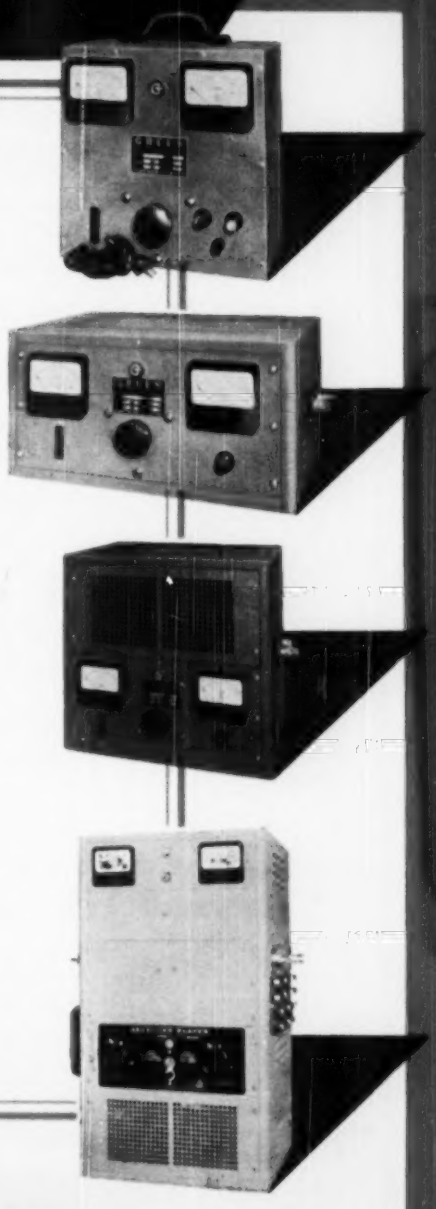
Custom-Building

Green Electric specialize in custom-building units to meet unusual requirements of layout or control, and have already engineered several thousand special jobs. A.V.S. (Automatic Voltage Stabilization) and A.C.S. (Automatic Current Stabilization) are two typical advanced developments originated by Green engineers.

ALSO AVAILABLE ON REQUEST:

Complete set of series of articles "Rectifiers for Electroplating," and "Rectifier Installations."

Rectifiers in the World ...



BENCH RECTIFIERS

The Bench Rectifier line offers a choice of twenty-six units of the portable or semi-portable type designed primarily for laboratory or small scale production work. They range in current capacity from 25 to 150 amperes and in maximum voltage ratings of from 6 to 16 volts. Special units can be had to provide higher voltages.

Standard units are equipped with cord and plug for connection to 115 volt A.C. outlet. Features include noiseless operation, natural-cooled selenium rectifier, circuit breaker switch, continuously variable voltage control, and many others. Full details are given in the Bench Rectifier booklet—Third Edition, available on request from Green Electric or its representatives.

MULTI-RECTIFIERS

The Multi-Rectifier is the de luxe laboratory power supply unit. It is three-phase operated and permits exact duplication, on a smaller scale, of the results to be expected in the plant from larger Selectro-Platers.

Four different voltage ranges are available at will from the Multi-Rectifier: 0-8, 0-16, 0-24 and 0-48 volts, thus permitting control tests or research on processes ranging from silver plating to chromic acid anodizing. Full details are given in the Multi-Rectifier booklet, available on request from Green Electric or its representatives.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 464.

W. GREEN ELECTRIC COMPANY, INC.

SELECTRO-PLATERS AND ALL TYPES OF RECTIFIER EQUIPMENT

GREEN EXCHANGE BUILDING, 130 CEDAR STREET, NEW YORK 6, N. Y.

PERMAG
Cleaning Compounds

prepares metal surfaces of your product for

BETTER FINISHES

Here's the list of Cleaning Operations for which PERMAG is particularly adapted.

Check those items listed below for your requirements—Tear out the list—Send to us.

Prove to your own satisfaction the efficiency of PERMAG in your finishing department.

PRE-SOAK COMPOUNDS
- ☐ TRIPOLI
- ☐ ROUGE
- ☐ STAMPING OIL

ELECTROLYTIC COMPOUNDS
- ☐ DIE CAST
- ☐ COPPER
- ☐ BRASS
- ☐ STEEL
- ☐ CATHODIC
- ☐ ANODIC
- ☐ AUTOMATIC SYSTEMS

BURNISHING COMPOUNDS
- ☐ ALUMINUM
- ☐ DIE CAST
- ☐ BRASS
- ☐ HARD WATER

ALUMINUM TREATMENT
- ☐ FROST
- ☐ ETCHING
- ☐ CLEANING
- ☐ DRAWING

ORGANIC FINISHING
- ☐ PRE CLEANING
- ☐ SPRAY BOOTH COATING
- ☐ WATER WASH SPRAY BOOTH ADDITIVE
- ☐ STRIPPING

If you have difficult metal cleaning or finishing problems, our Technical Service men are quite able to help solve them. Write us. No obligation whatever for demonstration.

MAGNUSON PRODUCTS CORPORATION

Main Office: 50 Court Street, BROOKLYN 2, N. Y.

In CANADA:
Canadian PERMAG Products Ltd., Montreal 1, Que.

Question Box

(*Continued from page 579*)

For deep etching dragon's and cloob be sprinkled on the resist which is again heated slightly. The dragon's blood can be applied before etching or after the dial has been partly etched.

The above is the ordinary method used in photo-etching or photoengraving but for special work there are details known to trained photoengravers.

The dial after cleaning the surface with any mild cleaner, e. g., magnesium and alcohol, is returned to the chloride of iron etching solution. It is then etched to the depth required for the design, i. e., the scale and the lettering or figures. After a thorough rinse a dip in a weak sulfuric acid-sodium bichromate solution will clean the etched design. Immersion in an ammonia-copper sulfate solution will give the black color to the etched design. The resist is removed in a weak alkali solution, the dial is cleaned with a soft brush, rinsed well, and dried, after which a clear lacquer is applied. This lacquer must be "flat", i. e., have very little gum in a nitro-cellulose base. Such lacquers can be purchased as silver lacquers.

The sample sent was silver plated with black scale, letters, etc. To obtain this finish the dial is silver plated after the first etch. The best results are had with an electrodeposited silver, although silver coating done by the immersion method can be used. After silver plating, carefully "scour" the silver coating with a fine brush, e. g., of camel's or goat hair, and cream of tartar and water to obtain a clear finish on the silver. Care should be taken to do the "scouring" in such a manner as not to leave any streaks. The process given above is then followed.

Note that since silver is not etched by chloride of iron it is necessary to remove it in 5 per cent nitric acid just previous to putting the dial in the chloride of iron etching solution. Immerse the dial as short a time as possible in the nitric acid as the resist may be attacked. Rinse dial well after nitric acid etching.—G. B. Hogaboom

If interested in additional profits

BABY SHOE PLATING

merits your investigation

The Pioneer company for Metal and Onyx mountings for the Bronze Baby Shoe Industry Invites your Inquiries

Write for catalogue

Hollywood BRONZE SUPPLY

Distributors of Ramyr Selenium Rectifiers

1770 N. Vermont Ave. - Hollywood 27, Calif.

AN OUTSTANDING *New* COPPER BATH

W·C·M *Brite Copper*

The research laboratory of a large national manufacturer pronounced this the finest cyanide copper bath ever brought to their attention.

Delivers a smooth plate in thicknesses of .0005 to .001, ready to go immediately into a bright nickel bath.

Commercially available for less than a year, **W-C-M BRIGHT COPPER** provides a denser, finer grained plate in shorter time than heretofore possible. No polarization on bagged anodes. Sharp edges and corners remain smooth. Free rinsing.

On buffing, comparison shows that even with heavy deposits, **W-C-M BRITE COPPER** has a superior flow.

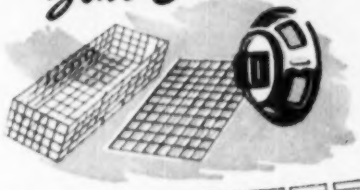
W·C·M *Zinc and Brite Dip*

Permits use of higher current densities without burning. (80 to 100 Amperes per square foot are not uncommon.)

Develops an extremely lustrous finish which is highly resistant to salt spray corrosion.

W-C-M ZINC has proven its merit in some of the largest installations in the country.

A LUSTROUS, CORROSION RESISTANT *Zinc Coating*



W-C-M BRITE COPPER is an improved process of copper plating that simplifies your plating problems. Reduces buffing costs on steel. Increases production.

W-C-M BRITE DIP is an after dip treatment that assures high salt spray corrosion resistance. Free from finger marking. It has won wide acclaim wherever used as an ideal zinc finish.

RETURN COUPON *Now* FOR FURTHER INFORMATION

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WIRE COATING & MANUFACTURING COMPANY
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Please send procedure sheets and detailed analysis regarding

☐ W-C-M Brite Copper ☐ W-C-M Brite Dip Zinc

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IRIDITE

gives galvanized parts

2-way RUST PROTECTION

A clean, sanitary appearance and freedom from corrosion are "musts" inside this beverage cooler manufactured by The Vendo Company, Kansas City, Missouri. That's why Iridite was chosen to finish hardware parts and the galvanized vending basket. Iridite stops galvanic corrosion because it forms protective barrier between dissimilar metals. Iridite blocks corrosion from moisture because it seals the metal from contact with condensed moisture.

3 WAYS TO USE IRIDITE

Iridite offers you a complete line of finishes for any zinc or cadmium surface . . . plated, die cast or galvanized, and for any finishing problem . . . corrosion resistance, paint base or eye appeal.

SIMPLE TO OPERATE

You'll find Iridite easy to use, too. It requires no special equipment or personnel, goes on with a short, non-electrolytic dip, dries fast and gives uniformly good results from manual or automatic application.

If you use zinc or cadmium in any form, you can use Iridite. Write today for data and samples, or, send specimens of your product for FREE IRIDITE PROCESSING. Special note: Ask about Iridite Bright for zinc or cadmium-plated parts. See how you can get durability and chrome-like brightness at amazing low cost.

ALLIED RESEARCH PRODUCTS, INC.

4004 EAST MONUMENT STREET
BALTIMORE 5, MD.

West Coast Licensee—
L. H. Butcher Co., Los Angeles 23, California

Equipment and Supplies

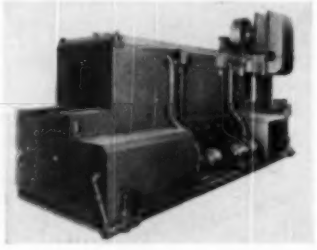
E—283. Dust-free Cleaners—New manufacturing techniques have virtually eliminated dusting and segregation in the Penn-salt line of cleaners, according to a recent announcement by the Special Chemicals Division of Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia 7, Pa.

E—284. Polishing Backstand—Model 6-A Air-Bench Backstand manufactured by Hammond Machinery Builders, Inc., 1697 Douglas Avenue, Kalamazoo 54, Mich., can be mounted on the wall, ceiling, or on a bench. It incorporates pneumatic belt tensioning by which an air-actuated cylinder automatically maintains correct belt tension. Different materials require different belt tension; after the correct tension has been determined, the operator merely sets the pressure regulator valve.

The unit has a 8-inch diam. x 4½-inch face stainless-steel pulley mounted on sealed, lifetime-lubricated ball bearings. Said to be ideal for use with narrow abrasive belts or soft contact wheels for irregular shapes, it is recommended for light or medium to light polishing. For further information, use Reader Service Card.

E—285. Spray Washer—Detrex Corporation, Detroit 32, Mich., has added a series of new metal-parts washers to its present line of cleaning equipment and chemicals.

These new washers feature standardized construction so that multiple-wash, rinse and dry-off stages may be incorporated



at minimum cost. They are designed so that if only spray stages are installed originally, a blow-off stage may be readily added at any time later, thus increasing the flexibility for a variety of production cleaning requirements.

These machines—the WB-100-S single-spray-zone unit and the WB-200-S two-spray-zone unit—may be used as standard metal-parts washers for ordinary alkali cleaning compounds or may be easily converted in a matter of minutes to efficiently handle those compounds

The Door is Open

ONLY **to those far-sighted and thrifty individuals who are interested in buying precision made plating racks, manufactured to be a permanent tool. Users of plating "hooks" are restricted to mediocrity.**

Imperial Plating Racks are honestly built to conform to the standards of a permanent tool. The only vulnerable part, which is the work holder, is made replaceable without injuring the insulation or apline section of your plating rack. NARACO® replaceable tip is your key to low maintenance cost and higher production output.

IMPERIAL PLATING RACK CO.

800 INDUSTRIAL AVENUE
FLINT, MICHIGAN

which have a tendency to foam excessively. The work is pressure-sprayed with cleaning solution from rigidly supported multiple spray headers. Spray nozzles are readily accessible for cleaning, and are adjustable so that they may be directed to any given point—top, bottom, and sides.

The blow-off stage, for both the single- and double-spray-zone machines, may be steam or gas heated, or built to give cold-air blast, whichever is required. The position of each blow-off nozzle is easily adjustable so as to strike the work at any desired angle. For further information, use Reader Service Card.

E—286. Air Compressor—Six new models of two-stage air compressors have been added to the spray painting and finishing equipment line of the Binks Manufacturing Company, 3114 Carroll Avenue, Chicago 12, Ill. The new models are de-

signed to supply compressed air for spray painting as well as air of higher pressures. In this way, the same compressor serves as a source of air for various uses. These new compressors are built for 200-psi working pressure, and tanks are tested to 300 psi; the standard pressure setting is 160 to 200 psi, but special settings are also available. Displacement of the new models range from 7.13 to 40 cfm and are powered by motors ranging from 1½ to 10 hp. For further information, use Reader Service Card.

E—287. Floor Cements Container—new composite container, designed to insure the maintenance of high quality through extended storage periods, has been adapted by the Special Chemicals Division of Pennsylvania Salt Manufacturing Company, 1000 Widener Building, Philadelphia 7, Pa., for its corrosion-resistant synthetic resin-type cement powders.

The basic container, known as the Leverpak Drum, is manufactured by the Container Company Division of Continental Can Company, Inc. To meet Pennsalt's requirements, the inside of the fiber drum is coated with plastic wax. This, in turn, is protected by a polyethylene bag liner, 0.002 inch thick. The cement is poured into the bag. An airtight condition is obtained by a lever-lock device that clamps the metal top, also covered with polyethylene, to the drum. For the present, Pennsalt is using these drums for its cements in 15-gallon and 41-gallon sizes.

E—288. High-Voltage Selenium-Rectifier Cell—A new high-voltage selenium-rectifier cell designed to permit the use of a smaller stack to achieve the same wattage output has been announced by General Electric's Lighting and Rectifier Divisions.

Rated at 18 volts d.c. output, a 50 per cent increase over low-voltage cells, the new high-voltage cell can be used in rectifier stacks for installations where space is limited and where the stack will not be required to operate continuously 24 hours daily for long periods.

An evaporation process which provides a uniform coating of selenium on each cell assures uniform characteristics of operation in electrical equipment requiring d.c. power, it is said.

E—289. Copper Anode—A new copper "Flat-Top" anode has been announced by Wagner Brothers, Inc., 425 Midland, Detroit 3, Mich. The new anode, according to the manufacturers, offers definite advantages over the familiar copper ball anodes of the same cost because the surface is smooth, eliminating the gates and flash which often cause hanging in the baskets and because complete freedom from cavities prevents inclusions of cop-

ONE solvent, ONE price for all jobs

The new Blacosolv is the most stable solvent we've ever offered for metal degreasing. Aluminum, steel, copper and precious metals may be safely and scientifically degreased with the same solvent.

Blacosolv contains a mixture of entirely new and different stabilizers. They are not alkaline materials which neutralize acid *after* breakdown. They are new stabilizers that *prevent* solvent breakdown and possible acid formation. Contains no alkaline materials that can be mistaken for stability . . . no masking agents are added.

USE BLACOSOLV IN ALL SOLVENT-VAPOR DEGREASERS

G. S. BLAKESLEE & CO.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50 ILLINOIS
NEW YORK, N.Y. TORONTO, ONT.

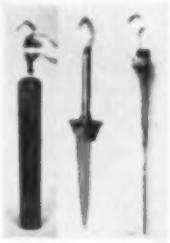
per oxide, silica, and dirt. They also point out that Flat-Top has 20 to 25 per cent more effective area than a ball of

the same diameter and more metal per anode, thus reducing loading frequency.

The advantages of Flat-Top over oval anodes include absence of heavy scrap in the form of "swords" and hooks, and maintenance of constant anode area with a consequent decrease in sludge formation and rough plating. They are said to be manufactured of the highest purity copper available and under controlled conditions which prevent contamination. For further information, use Reader Service Card.

E—290. Anode Hook—A new type patented hook for elliptical anodes, which is said to cut anode scrap by as much as 50 per cent and permit use of shorter anodes, has been announced by The Udylite Corporation, Detroit 11, Mich. The hook allows the entire anode to be immersed in the plating solution. In the past, several inches of the top of the anode were kept out of the solution to protect the hook from being eaten away. This top part of the anode was often discarded as scrap. One year of testing in a job plating shop has shown that this new anode hook is usable over and over, since it withstands all plating solutions and temperatures.

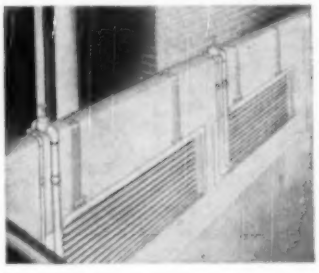
The practicability of this new hook centers around a specially designed cap of neoprene rubber which fits over the top of the elliptical anode. It has rubber



shoulder-like projections which protect the center section of the anode where the threads of the hook fasten into the anode. When the hook is turned tightly into the anode, the pressure of the hook against the cap seals the anode top to the hook and does not permit plating solutions to seep into the section where the hook threads enter the anode.

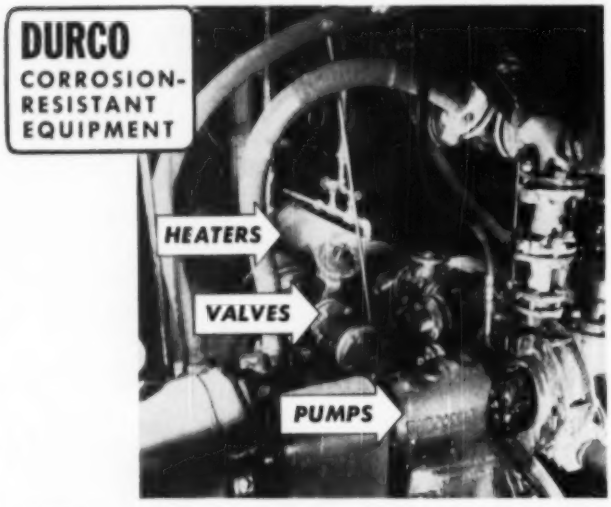
The new hook comes in two sizes, 6 and 8 inches, and fits all anode rods up to and including one and one-half inches in diameter. For further information, use Reader Service Card.

E—291. Heating and Cooling Coil—A new type heating and cooling coil for plating, degreasing, pickling and anodizing tanks, which is believed to obsolete conventional pipe coil, is announced by The Udylite Corporation, Detroit 11, Mich. The patented design of embossed metal plates permanently welded together



is said to have important advantages: higher BTU capacity per unit area, rapid and even heat transfer, small coil space, easy installation, low maintenance cost, and lower initial cost. The new coils are said to fit practically every size and design of tank.

Very often stray currents or unaccountable chemical reactions quickly deteriorate a coil to uselessness. Pipe coils must be removed, cleaned, welded and patched by expensive labor during shut down. Udylite Platecoils can be removed and re-



Standard Durco "packaged" units are available with one to nine or more heat exchangers in banks—together with the necessary corrosion-resistant valves, pipe, fittings and pumps—supported on one frame. For further information on typical layouts ask for folder T.

FOR CORROSIVE PLATING SOLUTIONS

These Durco heat exchangers, pumps and valves safely handle Watts nickel plating solution at the Lukens Steel Co., Coatesville, Pa.

Durco equipment is able to withstand corrosive service like this because every part that comes in contact with the corrosive is made of DURIRON. This Durco high silicon iron is completely resistant to practically every plating solution...copper, chrome, nickel and others.

For maximum plating service with minimum maintenance, specify Durco equipment.

For further information—on Durco valves write for Bul. 610; on Durco pumps write for Bul. 815; on Durco heat exchangers write for Bul. 1603.

DURCO
CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON CO., INC., DAYTON 1, OHIO
Branch Offices in Principal Cities

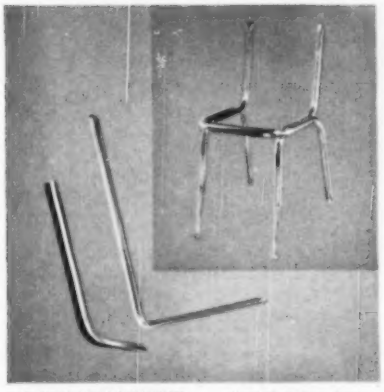
DURCO Adv. 68 GM

SAVE *up to 50% of present cleaning costs!*

DIVERSEY* No. 909

Unique Heavy Duty Soak Tank Cleaner

CAN ELIMINATE SOLVENT PRESOAK AND HAND-WIPE OPERATIONS!



TUBULAR STEEL FURNITURE . . . estimated savings since Diversey No. 909 was applied to cleaning operation . . . $15,000.00 per year!

STAINLESS STEEL MOULDINGS . . . cost of cleaning material reduced 67% . . . represents savings of from $8,000.00 to $10,000.00 per year!

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So, for bright, adherent finishes . . . for better cleaning at surprisingly lower costs . . . investigate Diversey No. 909 now! Regardless of the soil to be removed . . . be it polishing, buffing, drawing or forming compounds, smut or heat treating salts or quenching oils . . . regardless of the metal you are using . . . iron, steel, copper, brass, magnesium, zinc alloys or stainless steel . . . you owe it to more efficient, more economical cleaning to check Diversey No. 909 today! Mail the handy coupon below for complete information!

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Metal Industries Department

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THE DIVERSEY CORPORATION
METAL INDUSTRIES DEPARTMENT
53 W. Jackson Blvd., Chicago 4, Ill.

Gentlemen:
Please send me complete information on Diversey No. 909, including New Bulletin.

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Company _____

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Equipment and Supplies

placed by new ones without shutdown at a cost comparable to the labor necessary to repair old pipe coils. The coils are available in three metals—cold rolled steel, stainless and monel—and two styles. For further information, use Reader Service Card.

E—292. Nylon Anode Bags—Enthone, Inc., 442 Elm Street, Dept. P, New Haven, Conn., has announced the development of new nylon bags to cover nickel, copper, silver, zinc and other metal anodes used in electroplating solutions.

Made out of sturdy nylon of 66 x 48 weave, they are stated to be over 50 per cent stronger than comparable cotton bags. In addition, tests have indicated that the strength of these bags is maintained in both acid and alkaline solutions at temperatures up to 150° F for long periods of time. For example, two months' immersion in a bright nickel

plating solution of *p*H 3.5 produced no measurable change in bursting strength or tear strength. The bags are ordinarily supplied 4 inches longer than the length of the anode to allow accumulation of sludge, and a nylon draw cord is also provided. The cost of the bags is stated to be equal or less than comparable cotton bags. For further information, use Reader Service Card.

E—293. Plating-Rack Coating—An improved coating that combines high resistance to corrosive solutions with lasting toughness and adhesive strength is announced by Belke Manufacturing Company, 947 N. Cicero Avenue, Chicago 51, Ill.

Known as Belke Universal Plastic, the coating is claimed to give long service on plating racks through copper, nickel, chromium, cadmium, zinc and other cleaning and plating cycles, permitting complete plating of articles with one racking. The high strength of the bond, combined with the resilience and toughness of the material, is said to enable the coating to withstand the abrasion that heavy racks encounter. The surface of the coating is smooth, nonporous and pit-free, reducing drag-out.

The coating is composed of 100 per cent solids; no thinners, reducers, or solvents are used. One dip forms a heavy coating of uniform thickness which is heat cured at temperatures about 350° F. The coating does not soften in hot plating solutions. It is claimed to give remarkable service also on tanks, dipping baskets, pipes, fittings, valves, and other equipment requiring protection against corrosion.

Belke Universal Plastic is applied by the manufacturer or may be purchased for application by the user. For further information, use Reader Service Card.

E—297. Corrosion-Resistant Plastic Paint Coatings.—A line of corrosion-resistant plastic coatings for the protection of machinery, processing equipment and general factory maintenance in the finishing industry has been developed by the Poly-Cyclo Products Company of Cleveland, Ohio. Sold by Munray Products, Inc., 12400 Crossburn Avenue, Cleveland 11, Ohio, this Cyclon series "NPC" coating is said to be an inexpensive, easily applied, high-solids synthetic paint that air dries quickly by solvent evaporation to an adhesive, hard wearing, flexible glossy coating. No conventional priming or intermediate coating procedure is required. The moisture-vapor transmission rate of a 0.002 inch thick film is said to be less than 2 grams per 100 square inches of area in 24 hours at 100 per cent relative humidity. The nonoxidized Cyclon coatings are claimed to retain their flexibility over a wide range of temperatures and are recommended for services which reach 180° F. For further information, use Reader Service Card.

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Now ready to serve manufacturing firms in the midwest region with the fine industrial finishes which for fifty-six years have been supplied from our eastern division in South Kearny, New Jersey.

We would like to tell you more about how this new plant and Egyptian Finishing materials can help you make a better product.

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New York 20, N. Y.

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Reduce Finishing Costs with ALUNDUM Abrasive!

ALUNDUM Polishing Abrasive is available in a wide range of sizes and with special surface treatments to meet the exact requirements of every polishing job. For helpful polishing tips and for full details on cost-cutting ALUNDUM abrasive see your Norton distributor—or write for a free copy of "Setting-up Metal Polishing Wheels and Belts".

Right for Tumbling

ALUNDUM Tumbling Abrasive is an ideal tumbling medium because—it's **all abrasive** for a continuous cutting action—it's **heavy** for the fast, positive cut—it's **hard and tough** for a long productive life. Contact your Norton distributor for full details, or write for "Precision Tumbling with ALUNDUM Abrasive."

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METAL CLEANERS

metso granular, metso 99
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High conductivity of electro-cleaning baths which contain Metso Detergents speeds up grease removal. And, under high current density, Metso cleaning baths are stable. With Metso, also, you can be sure of spontaneous emulsification of oils, dispersion in the solution, and this "plus" advantage — protection from the re-depositing of removed dirt.

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NEBCO's best advertisement for its buffing and polishing wheels has always been *satisfied customers* . . . because they recognize and appreciate top quality, complete honesty and dependable performance in a product they use.

NEW ENGLAND BUFF COMPANY

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7338 Woodward Avenue, Detroit 2, Michigan

Trade Literature

L—215. Stabilized Degreasing Solvent—G. S. Blakeslee & Company, Dept. 6, Chicago 50, Ill., offers a leaflet which describes the New Blacosolv and the new stabilizers that it now contains. These stabilizers are said to prevent solvent breakdown and formation of acids instead of neutralizing the acids. They are present in both the liquid and the vapor and do not react with fatty acids, thus reducing the necessity for frequent tests on the solvent. For your copy, use Reader Service Card.

L—216. First-Aid Cabinets—A 1-page bulletin published by Industrial Products Company, Philadelphia 33, Pa., describes two Clearview First-Aid Cabinets of steel construction finished in white enamel and with glass doors. Both are said to meet State and insurance company requirements. For your copy, use Reader Service Card.

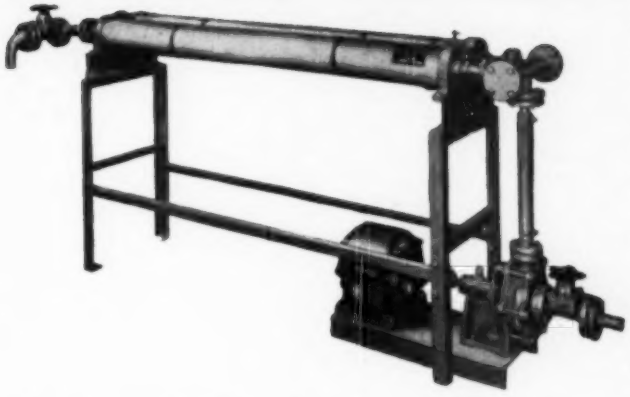
L—217. Dust and Mist Collection—Ultrasonic Corporation, 61 Rogers Street, Cambridge 42, Mass., offers a 4-page bulletin which describes and illustrates its U-4 Sonic Generator and sets forth its various applications for small-scale agglomeration of fine dusts and mists for collection in cyclones. Reference is made to the larger Model U-3. For your copy, use Reader Service Card.

L—218. Heavy-Duty Blower—Sutton Manufacturing Corporation, 116 W. Wilson Avenue, Norfolk 10, Va., whose line includes pumps, blowers, and tank units for many industrial and marine uses, has introduced a new heavy-duty utility blower which may be used for ventilating and exhausting, forcing air through washers, dryers, and ovens. It is made in three sizes, and designed for smooth running at slow speeds. This new IB series described in Catalogue 481 is made with accurately balanced curved-vane impellers, cast aluminum-alloy housing finished with baked corrosion-resistant enamel, and may be mounted in any position. Model IB-3110 powered by a 28-watt, 1/70-hp motor yields a free displacement of 55 cubic feet per minute. The 48-watt IB-4110 displaces 115 cubic feet and the IB-5110, with 110-watt, 1/25-hp motor, has a rated displacement of 300 cubic feet per minute. For your copy, use Reader Service Card.

L—219. Spray Painting Equipment—Two-color, 12-page condensed Catalog 48-A contains illustrations and brief descriptive comments on the line of spray painting, finishing, and air-service equipment manufactured by Electric Sprayit

NOW INDUSTRIAL'S HEAT EXCHANGERS

FOR NICKEL SOLUTIONS



The Same Unit for Heating and Cooling

That's one big advantage of INDUSTRIAL'S Unit Heat Exchangers — you use the same unit for both heating and cooling. Maintaining the desired working temperature, by continued heating or cooling in the one unit, simplifies controls and operation. The units are adaptable to either manual or automatic control.

INDUSTRIAL'S Unit Heat Exchangers are available complete with pump and stand, or tubes alone can be had for wall or ceiling mounting. A wide choice of capacity, too, is possible by using from one to six tubes in a unit. Special units are readily engineered to meet unusual capacity or space requirements.

This design of unit heat exchanger employs an inner tube of pure nickel for the solution giving an excellent heat transfer rate. Sudden temperature changes have no ill effects. Ease of inspection and cleaning is assured by a simple header construction. Rubber lined headers and diaphragm valves are used throughout.

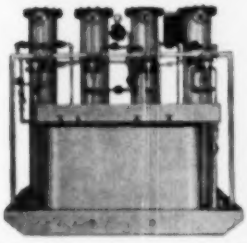
These INDUSTRIAL Unit Heat Exchangers have been thoroughly field tested and proved for dull, semi-brite, and brite nickel plating solutions.

★ *Write for full information and recommendations*

INDUSTRIAL'S WATER DEMINERALIZERS and WATER SOFTENERS

for

Water that leaves no stains after hot rinse
Water that causes no unwanted precipitates in solutions

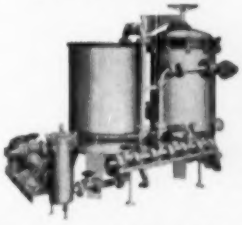


Model L-200 Four-Bed Industrial Water Demineralizer for a nominal flow rate of 200 gph. Other standard models available with capacities of 5 to 1000 gph. Special units of any capacity engineered to requirements.

INDUSTRIAL'S FILTERING SYSTEMS

for

Dependable Results in Solution Clarification



A typical Industrial Stationary Filter System. Standard models—portable and stationary types—are available in capacities of 100 to 15,000 gph. Special filters are engineered to meet unusual requirements.

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Centrifugal

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Salt Fog
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RUBBER DIVISION
Vulcanized Linings • Molded Products

WATER DEMINERALIZERS

Trade Literature

Company, 1415–1425 Illinois Street, Sheboygan, Wis. Included are spray guns, air-compressor paint-spraying outfits, tank compressors, air transformers, air-line assemblies, pressure paint tanks, air tools, etc. For your copy, use Reader Service Card.

L—220. Industrial Thermometer—The Dillon stainless-steel thermometer which comes in 5-, 3-, 2½-and 1-inch dial sizes and stem lengths of from 4 to 42 inches, and covers practically every industrial use, is illustrated and described in a new 4-page bulletin "T" issued by W. C. Dillon & Company, Inc., 5410 W. Harrison Street, Chicago 44, Ill. For your copy, use Reader Service Card.

L—221. Training Course for Cleaner Service Men—The special 40th anniversary issue of Oakite News Service, house organ of Oakite Products, Inc., 140 Thames Street, New York 6, N. Y., shows how new field service representatives are trained in the latest technical developments and techniques of industrial cleaning and related operations. This is done by having the camera follow two trainees through the company's chemical research and service laboratories, into special lecture sessions by its field engineers, and through the many other phases of the course. Finally, an unusual photograph taken at the completion of the course shows a new service representative surrounded by 750 pounds of demonstrating and testing equipment, technical literature and other service aids, ready to assume his new duties in providing industrial plants with the all-around technical advisory service demanded by today's complex cleaning and associated problems. For your copy of the special issue, use Reader Service Card.

L—222. Protective Coatings—A standard size folder of information about the use and specification of Prufcoat Protective Coatings is offered by Prufcoat Laboratories, Inc., 63 Main Street, Cambridge 42, Mass. This so-called Proof Packet contains reports from outside testing laboratories, actual case histories, method for analysing painting maintenance costs and price list of interest to those who encounter out-of-the-ordinary painting problems and particularly those involving acids, alkalies, oil and water. For your copy, use Reader Service Card.

L—223. Steam Boiler—A 6-page bulletin 748, issued by Alert Boiler and Manufacturing Company, 315 W. Woodbridge Street, Detroit 26, Mich., describes the Alert Automatic Boiler. A package unit, which includes all fittings, controls, safety features, pump and condensate return system, it is interpiped and interwired at the factory and assembled on a permanent steel bed plate. Gas or oil fired, it is available in sizes of from 2 to 50 hp and delivers steam of 100 psi or higher. Full steam pressure is said to be reached in 25–30 minutes starting with a completely cold boiler. Each boiler is stamped by an authorized A. S. M. E. boiler-code inspector, and is also National Board approved. For your copy, use Reader Service Card.

L—224. Lining for Concrete Forms—U. S. Rubber Company, Rockefeller Center, New York 20, N. Y., has published a new manual on its Hydron absorptive form lining used in the construction of smooth, durable concrete surfaces. The manual discusses methods of installation, relative costs, applications, specifications. It quotes statistics to prove the advantages of concrete forming with Hydron over wood forming.

Hydron is said to avoid imperfections by absorption of air and water and by increasing surface density and abrasion resistance. Less surface wear and lower maintenance costs are claimed to result. For your copy, use Reader Service Card.

L—225. Demineralizers—American Cyanamid Company, Ion Exchange Products Department, 30 Rockefeller Plaza, New York 20, N. Y., offers a 30-page catalogue, "Filt-R-Still Demineralizers" which describes and illustrates its line of two- and four-bed demineralizers, principle of operation, capacities for waters of different hardness, specifications, and cost advantages over evaporation stills. Besides for water purification, these ion exchange units are used for waste liquor treatment and recovery of valuable metals. For your copy, use Reader Service Card.

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PHOSPHORIC ACID CLEANERS
for POSITIVE
PAINT ADHERENCE
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RUST-SOL #123 WASH-OFF TYPE
A new development in a concentrated Phosphoric Acid Cleaner, for wash-off or immersion type of cleaning. Recommended for use in hot or cold solutions containing as much as 5 parts of water. Acts in 1 to 2 minutes. Dissolves surface rust and corrosive salts. Prepares surface with a light etch for better paint adhesion. An excellent rinse for use after alkali stripping or cleaning.
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Designed to clean and prepare steel for painting by simple inexpensive hand application. Has exceptional wetting and dispersion qualities. At a recommended dilution with 2 to 3 parts of water, #103 emulsifies oil and grease—dissolves all rust and oxide and reacts with the surface to form an iron phosphate coating—a rust-resisting and dependable paint surface.
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Announcing—

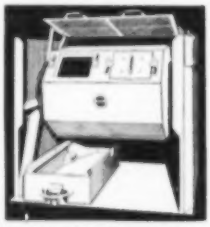
Roto-Finish COMPANY

the *NEW NAME* of
THE STURGIS PRODUCTS CO.

The Sturgis Products Co., Sturgis, Mich., producer of Roto-Finish materials, equipment and processes for mechanical finishing, has changed its corporate name to the ROTO-FINISH COMPANY, effective July 1, and will move all sales and manufacturing activities to its new plant in Kalamazoo, Michigan.

This change affects the name of the company only. Organization and corporate structure will remain the same.

Roto-Finish, the copyrighted trademark, was incorporated in the new name because it is widely known in industry and is more descriptive of the company's operation.



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Cuts Costs
Saves Time

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ORIGINAL ENGINEERED
MECHANICAL FINISHING PROCESSES

A. E. S. News

Mechanical Finishing Award

The certificate shown below accompanies the $100.00 prize offered by the Lea Manufacturing Company, Robert S. Leather, President.

The purpose of the Lea Award is to stimulate development in the field of mechanical finishing and publication of the findings in the Society's publications, this journal and the Proceedings.

This award, and the Chromium Plating Award, offered by A. W. Logozzo, are for the first time available for presentation at the Milwaukee Convention.

The International Fellowship Club Twenty-five Years Old

After twenty-five years of service to the metal finishing industry, the International Fellowship Club returns to the city where it was originally conceived to celebrate its Silver Anniversary, in conjunction with the Annual Convention of the American Electroplaters' Society.

The founding fathers of the Fellowship Club were Wilfred S. McKeon of the Sulfur Products Company, Frank Clark of the A. P. Munning Company, Patrick Bergan of Divine Brothers, and John McCabe of the Charles F. L'Hommedieu Company. After discussing their idea over a late cup of coffee, these men decided to organize a club for the suppliers and distributors of plating and finishing materials and equipment. The first meeting of the club was held at the A. E. S. Convention in Montreal in 1925. The following officers were elected at that time:

Chairman—Wilfred S. McKeon, Sulfur Products Company
Vice-Chairman—W. W. Wells, Jr. (Toronto)
Secretary—John Oberender, Zapon Lacquer Company

No dues are charged, and membership is open to all connected with the sale of plating and allied equipment and supplies.

The Fellowship Club meets once a year on the first day of each Annual Conven-

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This booklet explains what pH is —How it is measured—And how pH meters can work to your advantage.

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A. S. T. M.-A. E. S. SPECIFICATIONS FOR PLATED COATINGS

All numerical requirements refer to minima on significant surfaces.

Zinc on Steel: A164

Coating	Type G.S.	Type L.S.	Type R.S.
Zinc, inch	0.001	0.0005	0.00015

Cadmium on Steel: A165

Coating	Type N.S.	Type O.S.	Type T.S.
Cadmium, inch	0.0005	0.0003	0.00015

Nickel-Chromium on Steels: A166

Coating	Type D.S.	Type F.S.	Type K.S.	Type Q.S.
Copper plus nickel, inch	0.0020*	0.00125	0.00075	0.0004
Final nickel, inch	0.0010	0.0006	0.0004	0.0002
Chromium (if required), inch	0.00001	0.00001	0.00001	0.00001
Resistance to standard salt spray, hours without appreciable corrosion	96	72	48	16

*When copper is used in excess of a thickness of 0.0001 inch, its minimum thickness shall be 0.00075 inch.

Nickel-Chromium on Copper and Copper-Base Alloys: B141

Coating	Type F.C.	Type K.C.	Type Q.C.
Nickel, inch	0.0005	0.0003	0.0001
Chromium (if required), inch	0.00001*	0.00001	0.00001

*Maximum thickness should be kept below 0.00005 inch to prevent cracking.

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Nickel-Chromium on Zinc and Zinc-Base Alloys: B142

Coating	Type F.Z.	Type K.Z.	Type Q.Z.
Copper plus nickel, inch	0.00123	0.00075	0.0003*
Copper, inch	0.0004	0.0003	0.0002
Final nickel, inch	0.0003	0.0003	0.0003
Chromium (if required), inch	0.00001	0.00001	0.00001
Resistance to standard salt spray, hours without appreciable corrosion	48	32	16

*Total of 0.0003 inch if alternative of nickel only is used.

Lead Coatings on Steel: B200

Type	Copper inch	Lead inch	Salt spray Resistance* hours
E.S.	.....	0.0010	96
EE.S.	0.000015	0.0010	96
M.S.	.....	0.0005	48
MM.S.	0.000015	0.0005	48
P.S.	.....	0.00025	24
PP.S.	0.000015	0.00025	24

*To standard salt spray test in hours without appreciable corrosion.

Chromate Finishes on Zinc: B201

With two crossing, 1-inch long scratches through the chromate coating only, the part shall show no white corrosion visible to the unaided eye at normal reading distance after 24 hours in a standard salt spray test.

Postage Will be Paid by Addressee

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First Class Permit No. 11, Sec. 510, P.L. & R., Jenkintown, Pa.

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SATURABLE REACTORS

OUTSTANDING ADVANTAGES OF SATURABLE REACTOR CONTROL

- √ Smooth, unbroken flow of power to plating tanks.
- √ Ruggedly built like a transformer for many years of uninterrupted service.
- √ No loss of efficiency.
- √ No moving parts—nothing to wear out.
- √ Lower initial cost than other types of continuous controls.
- √ Simply adaptable to automatic voltage or automatic control.

The SATURABLE REACTOR CONTROL principle has successfully been used in many types of electrical applications. One that is readily ecognized is the gradual dimming and brightening of lights in huge public auditoriums and theatres. The Saturable Reactor is a development by electrical engineers to control a great amount of alternating current with a small amount of direct current by magnetic induction. Bart-Messing Corporation has successfully adapted Saturable Reactor Control in Sel-Rex Rectifiers to permit electro-platers to enjoy greater flexibility and save money while doing a better electro-plating job.

Illustrated is one of the Sel-Rex models equipped with Saturable Reactor Control. It is a 4 to 9 volt, 300 to 1500 amp. rectifier. It features another Bart-Messing development—removable panel for remote control operation, if desired. The unit, complete, is $1995.00 F.O.B. Brooklyn, N. Y. Automatic voltage or automatic current control, $250.00 additional.

Fill out and mail coupon today!

Bart-Messing Corporation
45 Morgan Avenue, Brooklyn 6, N. Y.

☐ Please send me full particulars on Saturable Reactor Controls.

☐ Please send me catalog on all Sel-Rex models.

Name of Company .....
Attention of .....
Address .....
City ..... Zone ..... State .....

One of the largest plating plants in America has a Sel-Rex 14,000 ampere, 9 volt Rectifier with Saturable Reactor Control and Automatic Voltage now in operation.

Manufactured by

BART-MESSING CORPORATION

45 Morgan Avenue . Brooklyn 6, N. Y.

Sel-Rex Rectifiers designed to your needs and to your specifications at any rating.

CUT DOWN REJECTS

WITH

ORVUS

IN YOUR METAL CLEANING BATHS

You'll find this synthetic detergent effective
— as a wetting agent
— as an emulsifier
— in dispersing lime soaps which might cause poor plating if allowed to deposit on the metal
— in speeding rinsing—minimizing water marks

Write for further information about Orvus to

PROCTER & GAMBLE, Cincinnati 2, Ohio

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"If it's metal finishing equip or supplies, we have it"

PESCO PERIODIC REVERSER

(electroplating interrupter)

SPEED UP THE RATE OF PLATING
PRODUCE HEAVIER DEPOSITS—REDUCE POROSITY
SMOOTHER SURFACES—BRIGHTER FINISHES
LESS BUFFING!!

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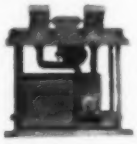

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Behind our seal lies a whole tradition of satisfactory service to community and nation. Through one hundred years of industrial progress, Apothecaries Hall Company has grown with Waterbury, shared in the development of agriculture and industry, and maintained its exceptional standards of loyal and productive service. The purchaser knows that wherever our seal appears, he is assured the ultimate in quality and service.

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5 ROHCO WAYS TO IMPROVE YOUR PLATING . . .

1. NO-CRO-MIST

Don't let Hot Weather Chromic Acid Smog jeopardize your health and waste your operating dollars! Not only does NO-CRO-MIST eliminate fumes from the plating room, but plant tests prove that its cost in dollars is actually less than that of the chromic acid saved. You, too, can enjoy these benefits . . . just try NO-CRO-MIST in your chrome tanks!

2. ROHCO 20XL CADMIUM BRIGHTNER

Achieves outstanding quality of Cadmium Brightness, directly from the bath without a bright dip. As one user has stated, brilliant deposits "out of this world," are consistently obtained. Throwing power is so improved that many items now still plated may be barrel plated with ROHCO 20XL.

3. THE 5 MINUTE HULL CELL TEST

If your plating bath is sick, the 5 Minute Hull Cell Test gets to the heart of the trouble and cures it. Simple, easy and accurate, the Hull Cell Test is used for Chromium, Bright Nickel, Zinc, Cadmium, Brass and Copper.

4. CHROMETER

A special chromic acid hydrometer—gives direct reading chromic acid in ounces per gallon at your ordinary operating temperature, no conversion necessary. Avoid errors.

5. FREE! PLATERS POINTERS

A new ROHCO publication containing valuable information on plating methods. Published at regular intervals and mailed free to platers.

ROHCO

R. O. HULL & CO., INC.
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"YOUR PLATING IS BEST WITH THE HULL CELL TEST"

TO GET THE FACTS—PIN THIS TO YOUR LETTERHEAD!

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tion of the A. E. S. It also sponsors an Open House on the first evening of each Convention, as well as an Annual Golf Tournament and a Ladies' Program.

The men who have held office in the Fellowship Club include most of the prominent leaders in the industry for the past quarter of a century. Present officers are:

Chairman—Louis M. Hague, President of Hanson-Van Winkle-Munning Co.

First Vice-Chairman—Rudy Hazucha, Sales Manager of the Clinton Co.

Second Vice-Chairman—George L. Nankervis, President of the George L. Nankervis Co.

Third Vice-Chairman—A. P. Munning, President of the A. P. Munning Corp.

Permanent Secretary (since 1929)—Thomas A. Trumbour, Business Manager of Finishing Publications, Inc.

Allentown-Reading Branch Receives Permanent Charter

Thomas M. Rodgers, Past President of the Philadelphia Branch, and initiator of the new Branch and Kenneth M. Huston, A. E. S. Past President, display charter presented on April 21 in the Parkside Tea Room, Reading, Pa.

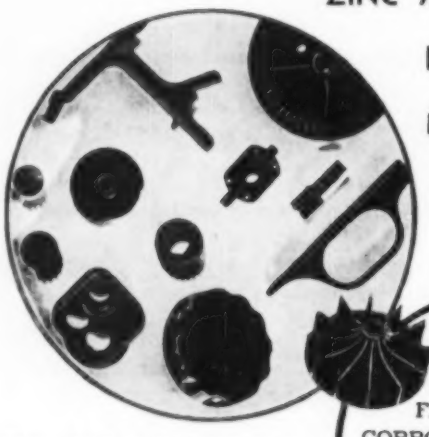
FINISH ZINC DIE CASTINGS

ZINC AND CADMIUM

PLATE with—

BLACK MAGIC

ZINC BLACK



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FAST WORKING
CORROSION RESISTANT
ABRASION RESISTANT
EXCELLENT PAINT BASE

Write for details. Send parts for sample processing without obligation. Also ask for literature on other BLACK MAGIC finishes, rust-proofing dips, metal cleaners, metal treating salts.

THE MITCHELL-BRADFORD Chemical Co.

MODERN METAL FINISHES

2446 T. Main St., Stratford, Conn.

Branch News

COMING EVENTS

DETROIT BRANCH

SECOND ANNUAL STAG DAY

Saturday, July 30
at Forest Lake Country Club
near Pontiac, Michigan

General Chairman; W. L. Pinner

Golf Beginning at 9:00 A. M.
(Special green fee, $2.00)

Afternoon Activities

Softball—Barnyard Quoits—Bait Casting for Accuracy—Baseball Throwing at Milk Bottles—Beans in the Bottle

Big Dinner in the Evening

Door Prizes, including Television Set

All are invited to this affair which will rival the Annual Banquet in entertainment value. Make reservation now. *Tickets* at $5.00 from Frank F. Clifton, 16536 Inverness, Detroit 21, Mich.

F. J. NEWMAN, *Librarian*

ADELAIDE BRANCH

A library of technical and trade literature has been formed for the use of members, and we take this opportunity to thank those advertisers in PLATING who have kindly supplied catalogues and other information.

The electroplating trade in South Australia has been concerned for some time because no recognized technical training school for electroplaters is operating here. Our Branch has been investigating proposals to organize a series of lectures on Principles of Electroplating and we hope that after April classes will be held before our regular meetings, which take place on the second Wednesday of each month.

Our March meeting was highlighted by a particularly fine address entitled "Electricity Applied to the Electroplating Industry" given by MR. H. CATCHLOVE of the Electricity Trust of South Australia.

B. H. S. DAY, *Hon. Secretary*

ALLENTOWN-READING BRANCH

The regular monthly meeting on March 17 was held in the 19th Street Vocational School with twenty members and guests present. FIRST VICE-PRESIDENT FOULKE presided over a brief business session in which two applicants were elected to active membership.

The speaker of the evening was MR. HOWARD SCHRADER of Reading Hardware Corporation, a member of the Branch. His topic was "Production Brass Plating". He first traced briefly the history of brass from its first use by the Romans to its earliest use as a coating obtained by metallurgical processes and

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TOPS IN PLATING EFFICIENCY

Illustrating our 1949 model of which entire construction immersed in solutions is made of high temperature DuPont Lucite.

The hexagon body of the cylinder is molded from a ⅛" thick sheet of Lucite; therefore, ribs are unnecessary. Cylinder ends are 1" thick.

Cam door locks fastened permanently to door replacing old style loose clamps easily dropped into plating tank or lost completely.

Note how the sides of the teeth of the Lucite ring gear are guarded affording permanent protection.

This type of cylinder can be used in all solutions both alkali and acid.

Cylinder can be supplied with overhead motor drive located on superstructure providing continuous rotation through the entire cycle of alkali cleaning, all rinsing, acid pickling, and plating operations without any transfer from one cylinder to another.

For all solutions and temperatures not to exceed 200° F.

Cylinders can be supplied in single or multiple with tanks complete.

This high temperature Lucite cylinder will provide longer performance life than any other plating cylinder of resinous materials.

Production from this type of cylinder is far in excess of that which is now obtained in any other horizontal cylinder plating equipment now in use.

The NEW 1949 "LUCITE" Portable Plating Barrel

MADE IN TWO SIZES { 6" x 12" weight 20 lbs. complete / 8" x 18" weight 34 lbs. complete

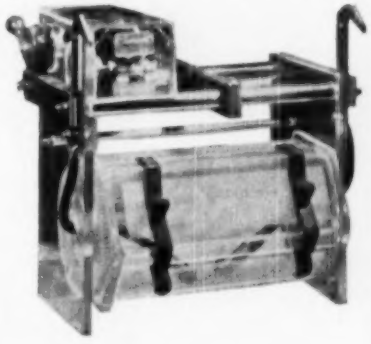
● The best looking ● The best mechanically ● The best in production ● The best from any way you look at it ● Revolves through the entire plating cycle which speeds up all operations.

IT HAS NO EQUAL—PRICE OR OTHERWISE

6"x12"—$167.50 **8"x18"—$250.00**

with standard perforations of 3/32" or larger

Smaller perforations $5.00 to $15.00 extra



Order today and you will find it to be the best investment you have in your plating room.

As Lucite is non-absorbant, one unit can be used for all your solutions.

Where can you get one plating barrel to do so many operations with so little effort . . . ***why from STUTZ of course.***

Illustrating our Lucite cylinder mounted to a superstructure of another make.

Now is the time to modernize your present equipment.
Replace your less efficient rubber, Bakelite, or Melamine cylinders with our high temperature Lucite cylinders.

You have experienced small pieces trapped back of ribs and thin pieces wedged between ribs and panels making unloading difficult.

Avoid all of this by replacing your Bakelite, Melamine or hard rubber cylinders with our high temperature Lucite ribless one piece construction.
Our ribless Lucite cylinders unload instantaneously.

In addition we can convert old style hanger arms and gears to our reinforced Lucite and then the assembly can be carried through the entire plating cycle.

ORIGINATORS OF THE FIRST PLATING BARREL TO WITHSTAND THE COMPLETE PLATING CYCLE AND IN COMMERCIAL OPERATION TODAY

If STUTZ sells it, it has to be good

PEERLESS PRODUCTS

GEORGE A. STUTZ MFG. CO.

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ON DISPLAY . . . STUTZ HEADQUARTERS, SCHROEDER HOTEL

finally as an electrolytic coating. He then discussed the limitations of the better known and widely used brass solutions of today. Finally he presented the high-concentration solution developed and employed by Reading Hardware. This solution permits high production rates in a fully automatic cycle with current densities as high as 40 asf.

Following Mr. Schearer's most interesting paper, W. B. Pfeiffer, Jr., presented a General Motors movie entitled "Progress Through Engineering".

J. F. Riegel,
Secretary-Treasurer

BALTIMORE-WASHINGTON BRANCH

The regular monthly meeting on April 12 had an attendance of about fifty. After a short business session, Dr. William Blum introduced Mr. William M. Phillips, Head of the Electrochemistry Department of General Motors Research Laboratories. Mr. Phillips gave a very stimulating talk on the instruments used for control in electroplating. He described the use of such instruments as the electron microscope, brush analyser, Hull cell, spectrograph, spectrophotometer, magnegage, and spiral contractometer, giving typical measurements made by them. H also spoke about X-ray diffraction, hardness measurements, and other metallurgical measurements. Performance tests were also discussed. After the talk, there were numerous questions from the floor indicating a lively interest in the subject.

Fielding Ogburn,
Secretary

BOSTON BRANCH

Three new members were elected and one former member reinstated at the meeting on March 3.

The Boston Public Library has tentatively agreed to serve as depository for A. E. S. publications and is only awaiting the formality of assurance that everything will be free with no strings attached.

Dr. George P. Swift, Manson Glover and Louis V. Gagnon were elected Delegates to the Annual Meeting in Milwaukee, with Leonard Chesworth, Harold Narcus and William Irby as alternates. Harold Narcus was also appointed Exhibits Chairman for the Branch.

Mr. Narcus, who is President of Electrochemical Industries, Inc., Leominster, Mass., then spoke about "Plating on Plastics". He discussed first the conventional silvering method and then in some detail his new coppering method. (See 1948 *Proceedings*.) Samples were on display showing all types of plating and considerable variation in design and finish. Seventy-two attended the meeting.

George P. Swift,
Secretary

BRIDGEPORT BRANCH

Thirty-three members and guests attended the regular meeting on March 4. Two fathers of members had passed away, Louis McNeil and Joseph Kezi, and the Branch expressed its sympathy to their families. Three new members were elected and seven were suspended for nonpayment of dues. President Temple appointed a Banquet Committee consisting of William Ehrencrona, Chairman, Carl Schaefer, Ray Kwasnik, Arthur R. McNeil, Ray Gobal, and Joseph G. Sterling.

Librarian McNeil then introduced Mr. Kellogg of the University of Bridgeport, the student body of which has grown from 57 in one building to 2394 in 18 buildings. He discussed the possibility of inaugurating a class devoted to metal finishing and basic chemistry at the School of Chemical Engineering.

After adjournment Frederic B. Stevens, Inc., through its Mr. Walter T. Lynch of New Haven, Conn., served refreshments.

Joseph G. Sterling,
Secretary-Treasurer

NO SHUT DOWN
to carbon treat solution with . . .

SPARKLER *horizontal plate* FILTERS

Only a few minutes are required to lift out the horizontal plate assembly in a Sparkler Filter and drop in a clean set of filter plates and production is under way without appreciable interruption.

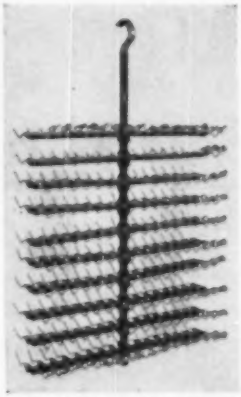
Tanks are given a carbon treatment without shutting down production in the battery installation shown here. One or two filters are cut out of the line, drained, cleaned and dressed with clean filter papers. The proper amount of carbon is mixed with water in a stand-by tank and recirculated through the filters thus depositing the carbon on the plates in a cake of uniform thickness and density. The solution requiring a carbon treatment is then circulated through the carbon beds giving the plating solution the carbon treatment without contaminating the tank or stopping plating operations.

Sparkler Horizontal Plate filters give absolutely sharp filtration at all stages of the cycle.

A battery of 18 Sparkler Filters in one of the largest bright nickel plating plants in the world.

SPARKLER horizontal plate FILTERS

SPARKLER MANUFACTURING CO., MUNDELEIN, ILLINOIS



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STANDARD RACKS and PARTS

WE WILL DESIGN RACKS FOR EVERY REQUIREMENT. LET US SOLVE YOUR PROBLEM AS WE HAVE FOR MANY LARGE AND SMALL MANUFACTURERS IN THE PLATING INDUSTRY.

A COMPLETE PLATING RACK SERVICE

A complete, engineered rack designed specifically for your work—or, the same standardized, interchangeable parts and materials, for those who build their own, are available at *Standard* in any quantity. When you buy *Standard* you buy *experience!* Couple this with our modern, fully-equipped plant, which is devoted exclusively to the manufacture of plating racks and parts, and you have the key to our recognized leadership in this field.

Excellent evidence of our leadership and aggressive research is our Stand-it-All Insulation. Flexible and tough! When bonded to the rack, it prevents plating up of the rack, saves current, plating material—*and the rack.*

RACK INSULATION:
Quality and Service

INSULATING MATERIALS:
Stand-it-all Plastisol
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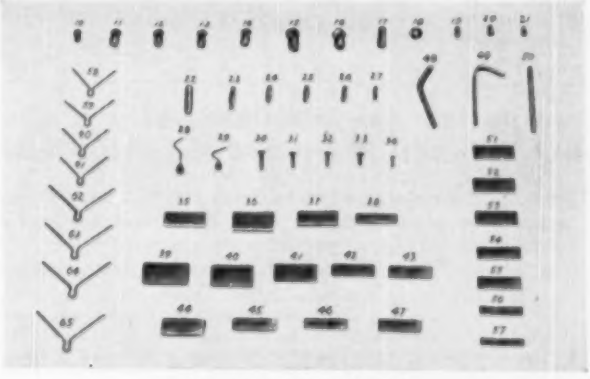
Stand-it-all XXX

PARTS:
Studs, brackets, bending jigs, tips, round edge copper, phosphor bronze wire, and aluminum.

RACK REPAIR KITS:

Write for Parts Catalog and Prices.



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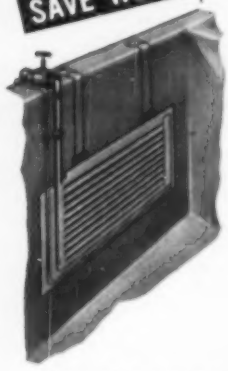
"RACKS IS OUR BUSINESS"

STANDARD PLATING RACK COMPANY

1913-25 N. PAULINA STREET CHICAGO 22, ILL.

SAVE TIME
SAVE MONEY
SAVE WORK

The new
Udylite
PLATECOIL



• You no longer need to use expensive bulky pipe coils to heat or cool tank solutions. The Udylite PLATECOIL will heat or cool efficiently and economically. PLATECOILS are made by joining two embossed steel plates to form channels for steam, hot water or coolants. They give more rapid heat transfer than pipe coils—are easier installed—cost you less. Available in three metals and two styles—fit into practically every size and type of tank. Write for further information.

- Higher BTU Capacity Per Square Foot of Area
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Udylite
CORPORATION
DETROIT 11, MICHIGAN

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Zialite
Reg. U. S. Pat. Off.

for NICKEL PLATING

The one bath especially designed for plating DIRECTLY on WHITE METAL ALLOYS including ZINC, LEAD and ALUMINUM. ZIALITE also plates on COPPER, BRASS and IRON.

for HARD CHROMIUM

USE
Zialite ADDITION AGENTS
Finer-grained deposits.
Increased throwing power.
Less sensitivity to sulfate content.

ZIALITE CORPORATION
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Want to Cut DOWN Spoilage?

Want to turn out better plating?
Then tie in with Munning & Munning—Now!

For over 18 years, we have been improving plating methods with better equipment and supplies. Tie in with us now. Tell us your problems. Our sales engineers will come up with the best answer. Advice is free for the asking and there are no "strings attached."
The "Munning" line is complete. There's an equipment or supply item for every electroplating need. Here are a few of the many standard products. Special needs can also be met.

Abrasives • Agitators • Anodes • Brushes • Buffs • Barrels (all types) • Compositions • Dipping Baskets
Driers • Filters • Generators • Heaters • Lathes • Plating Machines • Rectifiers • Rheostats, etc.

Don't wait——Write now——Tie in with "Munning"

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Manufacturers of Electroplating, Bufing, Polishing, Equipment and Supplies
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THE GREATEST NAME
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Buffing and Polishing Wheels for Every Operation

BRANCH OFFICES
DETROIT • LOS ANGELES • GRAND RAPIDS • PHILADELPHIA

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CHICAGO BRANCH

Eighty-eight members heard Mr. C. R. Fischmuth of Western Electric Company speak on "Industrial Methods of Automatic Plating on April 8". His extremely profitable talk was accompanied by slides showing actual automatic plating set-ups at the Western Electric Company. Among interesting points brought out were use of an anodic cleaner operated at 150° F; an acid dip in the automatic line consisting of concentrated hydrochloric solution with 2 to 4 volts a.c. superimposed; following a rinse, an anodic treatment in the cyanide bath; completely submerged anode rods made from Armco Iron in the large zinc plating tank. Mr. Fischrupp also showed graphs and charts employed to maintain accurate control of plate thickness and adhesion. Samples were taken from production lots and immediately sent to the laboratory for mounting and thickness check. The charts were maintained on an hour-to-hour basis and showed daily percentages of acceptable plated work. For a combination wear and corrosion resistant finish is used a 20-minute dull white nickel plate followed by an 18-minute hard chromium plate. A contact lever with this coating performs satisfactorily after 5,000,000 contacts. The usual open question period followed during which some problems were discussed in a lively fashion.

The following officers were elected and the Chicago Branch wishes everyone success in his new position.

President—Paul Glab
First Vice-President—Joseph Boudreau
Second Vice-President—Arthur Bartmann
Secretary-Treasurer—J. M. Andrus
Librarian—J. H. Monaweck
Board of Managers—Marion Longfield, Chairman; Leroy V. Zinn, and Lee Kocour
Delegates—Messrs. Longfield, Kelly and Andrus
Alternates—Messrs. Monaweck, Hazucha, and Gilbertson

A. G. Bartmann, *Correspondent*

CLEVELAND BRANCH

The Cleveland Branch elected new officers on April 1, the election having been postponed to that date because of the cancellation of the March meeting which was in conflict with the Annual Dinner date. The newly installed officers are: E. C. Friedl, President; L. N. Elicker, First Vice-President; and John Hallack, Second Vice-President. Librarian Howard Blouch and Secretary-Treasurer Harry Pochapsky were re-elected. Past-President Charles A. Carrick was elected to the Board of Managers for three years.

After L. N. Elicker had made his final report on the Dinner, which was an artistic success and almost made the grade financially, the date for the Annual Outing was set for July 30.

Dr. H. L. Kellner spoke on "Evaluation of Polished Surfaces", using slides to illustrate his talk.

Harry Pochapsky, *Secretary*

DAYTON BRANCH

Election of officers for the 1949–1950 term was held March 25 with the following results:

President—Elmar Rehme
First Vice-President—W. G. Cryderman
Second Vice-President—Ralph Clinefelter
Secretary—Robert S. Redman
Treasurer—Charles N. Chalfant
Librarian—Fred Bauch
Board of Managers—T. M. Kosor, Frank J. Klein, Herman E. Austen

Elected delegates to the Milwaukee Convention were L. A. Critchfield, Herman E. Austen, Frank J. Klein, with W. G. Cryderman, Charles N. Chalfant, and Fred Bauch as alternates.

The new officers will take over June 1. All members wish to thank the outgoing officers for their tireless effort to keep the Dayton Branch one of the best and for their able leadership.

A visit to National Cash Register Company was made on April 15 when all who attended had an opportunity to see one of the finest plants in operation. It is regrettable, that the few hours at disposal were not sufficient to see the entire plant. But it was generally agreed that it was one of our best plant tours, well worth the time spent. After the plant tour, Assistant Plant Manager Mr. E. W. Cochran gave interesting details of materials and processes.

Is METAL PARTS CLEANING a bottleneck in your plant?

DEGREASERS

WASHERS

DRYERS

A complete line of OPTIMUS Equipment is available in standard and special sizes to meet every metal parts cleaning problem and allied processing applications.

OPTIMUS VAPOR DEGREASERS are available in all various types and stages, straight vapor, vapor-spray, liquid-vapor and combinations of these. All sizes from simple batch type degreasers to custom built monorail or cross rod conveyor models.

OPTIMUS METAL PARTS WASHERS — single or multiple stage — screw or conveyor, mesh belt or monorail types. Can be applied to a wide range of operations as well as the handling of rust preventatives and other coatings.

OPTIMUS DRYERS embody a specially designed system of directional air jets which assure spotless drying after plating or polishing and before subsequent painting, plating or lacquering.

Submit your metal parts cleaning problem to our engineering staff.

Distributors of
"Midsolv"
A Perchlorethylene Degreaser Solvent
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OPTIMUS EQUIPMENT
FOR CLEANING · RINSING · DEGREASING · PICKLING AND DRYING OF METAL PARTS

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ALKALINE TIN PLATING

POTASSIUM STANNATE

With Potassium Stannate you can speed up your electro-tin-plating . . . increase your output from present plating equipment . . . lower your costs per article plated.

Potassium Stannate has higher conductivity . . . operates at increased cathode current . . . possesses excellent throwing power . . . all of which mean speedier deposition. It is flexible in use and may be employed with little or no change (except for higher currents) in your present procedures.

Recent changes in government restrictions now permit additional uses for tin plating. Investigate Potassium Stannate and the advantages it offers for both new and existing applications. Write for further information.

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Producers of Potassium Stannate, Sodium Stannate, Stannous Sulphate, Stannochlor and other Tin and Antimony Chemicals

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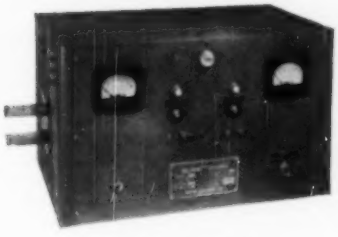
MODEL PRC 500



Bench Space 12 x 20

Model PRC 500 illustrated is capable of periodically reversing the polarity of 500 amperes of DC current supplied from either a motor generator or rectifier. All control units of this type may be installed with the present setup of any plating plant. Your present power supply need not be altered for a periodic reverse conversion. Unit comes complete with adjustable timing control in normal and reverse circuit.

Write for latest descriptive catalog

RAPID ELECTRIC CO.
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The Satisfactory Service of our BIAS Buffs is Remembered long after the price is forgotten!

Our BIAS Buffs are made to fit the class of work for which they are used

THE BIAS BUFF

—and that is why they rate so high in the metal finishing industry. But it is nothing new for them to effect savings—to last longer and produce more work. BIAS Buffs have done all that for years!

It's the material—the workmanship that produces these highly satisfactory results.

Suppose you give them a trial in your plant. Write us on your letterhead for our new Catalog.

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One new member has been elected and one has been received by transfer. Three have transferred to other Branches.

FRED BAUCH, *Secretary*

DETROIT BRANCH

Approximately two hundred members and guests were present at the regular meeting on April 1. Among the extraordinary guests were all the members of the Executive Board of the Society.

The membership was first entertained by a ten-minute talk by MR. CHARLES N. ISAACSON of the Houdaille-Hershey Corporation on the subject, "Evaluating Polished Steel Surfaces".

The main attraction was the presentation of a paper on "The History of the Development of Nickel Plating" by DR. ROBERT J. MCKAY of The International Nickel Company, New York City. In conjunction with his talk, he presented a movie on the subject, "History of Nickel".

Dr. McKay's lecture and movie, pointing to the original development of plating back to the year 600 B. C., were very well received. It is unfortunate that he was not allowed to talk two hours instead of the customary 30 to 40 minutes. It is hoped that the material which Dr. McKay has gathered together can be published shortly for the benefit of the entire Society.

F. J. NEWTON, *Librarian*

GRAND RAPIDS BRANCH

The meeting on April 8 drew approximately sixty members and guests. A proposed set of By-Laws for the Branch was discussed at length and finally adopted by vote of the members.

The annual election of officers was held and the following men were elected:

President—S. B. COWDERY
First Vice-President—R. JAGER
Second Vice-President—R. B. PERKINS
Secretary—F. J. DARLING
Treasurer—W. L. REED
Librarian—D. H. SCHANTZ
Assistant Librarian—H. L. GRUTTER
Board of Managers—L. B. SPERRY, W. J. ERSKINE, and J. H. SEIDEL

MR. B. F. LEWIS of the Northwest Chemical Company, Detroit, Mich., then discussed "Activated Surfaces". His subject was well received, and many questions were asked after the talk, resulting in a lively discussion.

The meeting was adjourned with the usual luncheon served by the Hotel.

J. M. HAGE, *Secretary*

JACKSON-LANSING BRANCH

The G. L. Nankervis Company sponsored the regular meeting on March 8 in Hotel Porter Lansing and procured the services of DR. M. M. BECKWITH, Manager of Technical Sales, The Harshaw Chemical Company, Cleveland, Ohio, who spoke on the subject, "Nickel Plate and Its Buffability". Dr. Beckwith used a slide projector to illustrate his very informative discourse.

On April 12, MR. HAROLD W. FAINT of the Industrial Filter and Pump Manufacturing Company presented a discussion on "Water in the Plating Room" and showed the highly entertaining movie, "Demineralized Water".

The annual election of officers was held at the same meeting with the following result:

President—L. M. HENDERSON
First Vice-President—U. J. FORSYTH
Second Vice-President—R. W. REDMOND
Third Vice-President—R. T. ROLLIS
Secretary-Treasurer—E. F. STREFLING
Librarian—JOE HOEFER
Assistant Librarian—E. J. BOSCA
Board of Directors—P. J. STRAIGHT, C. E. MCDOWELL, DR. D. T. EWING, E. L. DEMING, and MILLS DRAKE
L. M. HENDERSON, *President-Elect*

LANCASTER BRANCH

Fifty-seven members and guests attended the March meeting in the Research Laboratories of the Aircraft Marine Corporation. There, in Harrisburg, we were host to the meeting of the A. E. S. Research Committee and were consequently honored by the presence of the following members of that organization: MR. W. M. TUCKER of Eastman Kodak Company, DR. H. L. KELLNER of Lea Manufacturing Company, DR. R. A. SCHAEFER of Cleveland Graphite Bronze Company, and MR. L. WEEG of National Lock Company. Our own JOHN REYNOLDS, Production Superintendent of Charles Snyder & Sons Company, gave an interesting and well organized resume of "The Practical Aspects of Polishing and Plating". After the business of the evening had been concluded, we were treated to refreshments, including baked

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C. W. Smith, *Secretary-Treasurer*

MELBOURNE BRANCH

The 41st Regular Meeting was held in the Metallurgy Theatre of the Melbourne Technical College on March 17. After preliminaries of membership business and By-Laws revision, Librarian Hugh Teague introduced Mr. Jack Flavell, who gave an exceptionally clear and informative address on "Mechanical Finishing by Barrel Processing". The speaker explained how modern tumbling may be divided into 4 stages: grinding, boning, polishing, and colouring, and stressed the importance of correct choice of barrel speed, load, type of chip, and compound. These points were illustrated by passing around the audience examples of work done by the process in U. S. A.

Shortage of time forced Chairman Leigh to close a long and vigorous discussion period.

John J. Dale, *Hon. Secretary*

MILWAUKEE BRANCH

The 399th regular meeting April 1 began with reports of the committees appointed for the 1949 Convention in Milwaukee this June. Nominations for Branch officers were then held, with the final results to be published after the elections. Librarian Leslie Diveley introduced Dr. E. D. Haller, National Technical Laboratories, South Pasadena, Calif., who spoke about "pH and Its Control". He gave a very interesting talk and showed slides of a type of equipment which is in use in various industries throughout the country. Afterward a very lively question and answer period followed.

Harry J. Krueger,
Secretary-Treasurer

NEW YORK BRANCH

The Annual Educational Session and Banquet on February 26 in Hotel Statler was attended by 351 members and guests.

The Educational Program was conducted by First Vice-President George Heidmann. The papers included "Precious Metal Plating" by Mr. Ed. Rinker, Bart-Messing Corporation; "An Introduction to Metal Evaporation" by Mr. Harold Narcus of Electro-Chemical Industries; and "Surface Treatments for Stainless Steel" by Mr. Kenneth Huston of the Armco Steel Corporation.

Delicious turkey dinners were served mid the splendor of the Hotel's Manhattan Room. Entertainment by Charlie Peterson and his orchestra; Joe Rankin, xylophonist; George Prentice, puppeteer; the Vikings and the Pitchmen won out over the audience to the great satisfaction of all. Informal table hopping and dancing followed into the wee hours. The event was one to remember until next year.

Albert Fusco,
Recording Secretary

PHILADELPHIA BRANCH

In the absence of President Thomas M. Rodgers, who is recovering from a recent appendectomy, First Vice-President Dr. Samuel Heiman chairmanned the regular meeting on March 25 with fifty members and guests present.

The speaker was Dr. H. L. Kellner, Lea Manufacturing Company, who spoke about "The Evaluation of Polished Surfaces". Dr. Kellner described the photomicrographic, profilometer, and replica comparison methods, and illustrated with lantern slides the results obtained with each. The discussion following Dr. Kellner's formal remarks dealt mainly with practical polishing with his company's products.

The membership report revealed four new members admitted, one reinstatement, two new applications and one transfer.

The following were unanimously elected to serve during the 1949–1950 term:

President—Dr. Samuel Heiman
First Vice-President—George A. Gibbs
Second Vice-President—Robt. Graham

Secretary—I. William Marcovitch
Treasurer—George M. Long
Librarian—Albert Hirsch
Board of Managers—Nat. Verelle, Robert L. Farren, Jr., William H. Trusdell
Delegates—Thomas M. Rodgers, I. William Marcovitch, George M. Long

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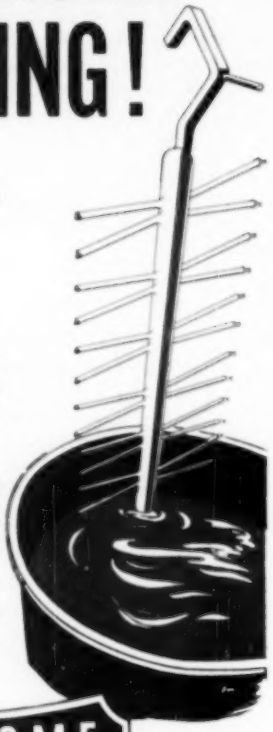

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Alternates—Fred Fulforth, George A. Gibbs, Samuel Heiman

President Heiman spoke about the scope and the activities of the committees which were to be organized during his term of office, and announced the following appointments of committee chairmen:

Membership—George A. Gibbs
Program—Albert Hirsch
A. E. S. Research—J. Albert Cairns
Educational—Albert Hirsch
Meeting Place—Nat. Verelle
Reminder—Joseph J. Duffy, Jr.

I. William Margovitch,
Secretary

ROCHESTER BRANCH

At the regular monthly meeting on April 15 it was decided to establish a Branch Library at the Rochester Institute of Technology. The Librarian and Mr. Swanson of the Institute will work out the details and report at the next meeting.

Mr. A. H. Du Rose of Harshaw Chemical Company, Cleveland, Ohio presented a paper on the "Per-flow Nickel Process" and showed a number of slides to illustrate his talk.

James Weaver, *Secretary*

SAGINAW VALLEY BRANCH

Forty-two members and guests attended the meeting on April 13. The meeting was opened by Rollie Durham who gave a farewell speech and turned the meeting over to the new President, Daniel P. Waits. Mr. Waits gave a short speech and organized a Policy Committee.

A small radio presented by James R. Brakeman of Macco Products Company as a door prize was won by Arthur D. Bessen.

Manuel Ben introduced Mr. Barney C. Case of the Hanson-Van Winkle-Munning Company, Detroit, Mich., who gave a very interesting talk on Project No. 5 of the A. E. S. Research Program. This project which is located at East Lansing under Dr. D. T. Ewing, is entitled "Effects of Impurities and Purification of Electroplating Solutions".

A very nice gesture was made by the salesmen connected with the Saginaw Valley Branch who donated five hundred dollars for the purchase of a movie projector.

John W. Lee, *Recording Secretary*

ST. JOSEPH VALLEY BRANCH

Thirty members and guests attended the regular meeting in Hotel Elkhart on April 6.

The following officers were elected for the year 1949–1950:

President—Ralph Wysong
First Vice-President—
Dr. Harold Weisner
Second Vice-President—
Victor Peterson
Secretary-Treasurer—Eugene Roth
Librarian—Ernest Wilhelm
Board of Managers—James Cushing, John Bayman and William McDowell.

Mr. B. F. (Bert) Lewis, Technical Director of Northwest Chemical Company, Detroit, gave a very explicit talk on "Electrocleaning of Metals for Good Plating". His popularity with our Branch is shown by the fact that this was his second talk to us within the last three years.

V. E. Peterson,
Secretary-Treasurer

SOUTHEASTERN BRANCH

The meeting on April 15, attended by fifteen members and guests, was called to order by Vice-President H. R. Stogner.

The following members were nominated and unopposed to serve as officers during the coming year:

President—H. R. Stogner
First Vice-President—E. J. Slemons
Second Vice-President—H. Y. Carson
Secretary-Treasurer—W. T. Weymouth
Librarian—Clyde Stovall
Board of Managers—D. J. Griffin, Claude J. Salley, and C. H. Horner

The address by Mr. Wilfred S. McKeon, Sulphur Products Company, Greensburg, Pa., on "Copper Stripping" was enjoyed by all.

The Secretary was instructed to see that each member receive a copy of the membership roll for the purpose of getting better attendance at our meetings

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FILTERS: All the common plating solutions: acid, bright nickel, cyanide, etc.

EASY TO OPERATE and simple to clean.

NO LOSS OF EXPENSIVE SOLUTIONS: Unit holds only a small volume of liquid, all of which is recoverable.

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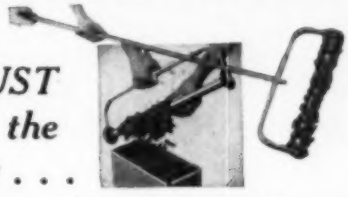

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Plating of Bright Nickel

(Continued from page 570)

codepositing with bright nickel, there is a marked decline not only in uniformity, covering power and brightness of the nickel but also in the subsequent coverage by the chromium deposit.

We have learned during the last three years to depend on spectrographic analysis to stay ahead of metallic impurities. Table I is a report of a spectrographic analysis of a deposit on our dummy cathodes. A periodic check of this nature enables us to know exactly where to make the necessary corrections. Table II shows a spectrographic analysis of the contents of pads taken from the filter. Table III is a report on the residue which had accumulated at the solution level in the nickel tank. This report showed too much silicon, a condition which was corrected by better rinsing after cleaning.

The most effective way to remove metallic impurities, as every plater knows, is through electrolytic purification. Many of the larger plants employ constant electrolytic purification and filtration. Small operators who complain about lack of facilities for proper solution maintenance may utilize an available small rectifier or generator and do their electrolytic purifying on down time, such as evenings or weekends. This method of obtaining d.c. current for this all-important operation is most economical. As for constant filtering of a nickel bath, it has been proved that if the metallic impurities are kept down and good housekeeping is practiced, this operation can be reduced to two or three hours daily.

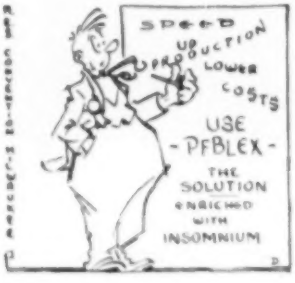
Nonmetallic contaminants, of which grease is one of the most troublesome, can be eliminated by the use of carbon treatment. Here again, good rinsing will help considerably to lessen contamination.

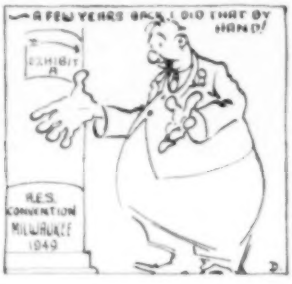
Fig. 7 is a view of a part of a bright-nickel and decorative-chromium setup.

Use of Polythene in the Plating Room

As has already been shown in Fig. 6, polythene tubing may be used for stopoff. Polythene chips and sheeting can be used to good advantage in the plating room. Fig. 8 is a view of a chromium plating tank in which a layer of polythene rod, ¼-inch long by ¼-inch diameter, is used to lessen fuming and reduce heat losses through radiation. Furthermore, the polythene chips may be used on a sulfuric acid strip for nickel. Paradoxically, in this application we get a two-way action: the chips not only keep the fumes down, but also serve to keep moisture out of the deliquescent sulfuric acid.

Fig. 9 illustrates the use of polythene sheeting around the anode bars in the nickel tank. This application makes it possible to dispense with the morning cleaning of anode contacts.





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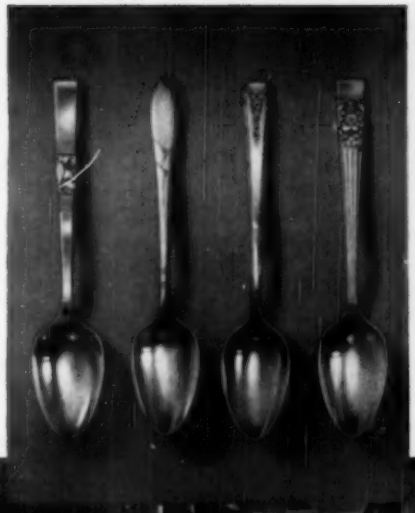
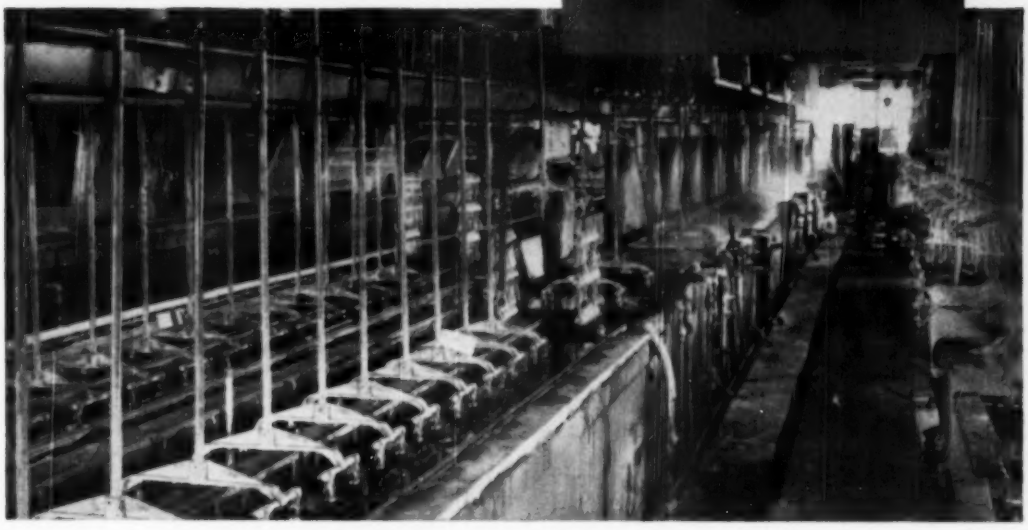
—WHO —THE KIDS OR MILWAUKEE?

For more than 10 years Oneida Ltd. of Community plate fame has consistently used Pennsalt Cleaners





The silverware plants of Oneida Ltd. have used Pennsalt Cleaners for more than a decade in the manufacture of Community, Heirloom Sterling, Tudor Plate and 1881 Rogers Silverplate. Pennsalt Cleaners have proved successful in the multi-step process of removing buffing compounds prior to silver plating. The task is especially difficult because of the filigree and embossing of intricate and deeply sculptured ornamentation.

There are Pennsalt Cleaners for practically every type of metal cleaning. These products are concentrated, highly active, free-rinsing and long lasting. Pennsalt's technically trained representative will gladly make a study of your process to determine how Pennsalt Cleaners can give you better work at less cost. Write to Special Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

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through their special effort of bringing someone with them each month.

WILLIAM T. WEYMOUTH,
Secretary-Treasurer

SPRINGFIELD BRANCH

The Springfield Branch met on March 28 after having missed its February meeting due to a heavy snowstorm. The main topic of conversation was the Regional Meeting in Springfield on April 30. The ticket sales had far exceeded the expectations and there was a general rush for tickets. Two new membership applications were given first reading.

MR. JOSEPH HAAS, Consulting Plating Engineer, spoke on "Automatic Plating Installations". He divided automatic installations into three categories, the return type, the straight-line type and the dwell type, and described the principles of each. Strong emphasis was placed on building automatic machines to the cycle required by the job rather than vice versa. Many factors were mentioned which are not apparent in hand-operated cycles but which may become troublesome in an automatic installation. A lively discussion period followed the very informative talk.

HAROLD OEHLER, *Secretary*

SYRACUSE BRANCH

The speaker on April 18 was DR. A. KENNETH GRAHAM of Graham, Crowley and Associates, whose topic was "Brass and Bronze Plating". Dr. Graham outlined the different types of brass baths and traced the effects of caustic and ammonia with some very good slides and plated samples. His figures on the cathode efficiencies of the higher concentration baths were in startling contrast to those of the brass baths with which most of us are acquainted, and we are all eagerly awaiting the publication of the paper for use as a reference on brass plating.

The report of the nominating committee offered the following slate:

President — HERBERT N. GERHARDT, GEORGE W. CAVANAUGH

First Vice-President—THEODORE DUVALL, GEORGE LAWRENCE

Second Vice-President—PALMER PENOVER, ARTHUR OVEREND

Librarian—GEORGE CAVANAUGH, HENRY HOLBERT

Secretary-Treasurer — KENNETH PARNELL, MARTIN LAWLER

Board of Managers—WALTER PIASECKI, CYRUS BOSWORTH, SIDNEY BLOCK, ROBERT CARPENTER, EDGAR HOLLISTER, and JOHN MAXIAN

Attendance was forty-two.

V. P. MCCONNELL, *Secretary*

TORONTO BRANCH

The April 8 dinner meeting was held in the Royal York Hotel with A. E. S. PRESIDENT S. S. JOHNSTON as the guest speaker. Mr. Johnston first presented a movie by the Weirton Steel Company titled "The Story of Tin Plate" and then discussed the affairs of the Society and the coming June Convention.

Roden Brothers of Toronto donated a silver deposited beer mug for the usual Lucky Draw.

The slate of new candidates for the coming election was presented. There were no further nominations, and the new executive will be elected by a direct mail vote.

L. S. WILLIAMS, *Correspondent*

WATERBURY BRANCH

Waterbury Branch is planning to hold another Ladies' Night meeting on Thursday, June 2, 1949. This year we are promised a story of equally great interest and romance, the story of oriental rugs with the history of the family and community woven into them, as Mr. Orlando Paddock's beautiful display of gems and his romantic story of each gem's rise to popularity, at last year's affair.

At the regular monthly meeting held April 8 MR. HAROLD NARCUS, Electrochemical Industries, Inc., Leominster, Mass., gave us details of his newly developed process for metallizing plastics in preparation for plating. (See p. 157 of the 1948 *Proceedings*.)

Another feature was the impressive motion picture film, "Air Lift to Berlin", which does much to illustrate the magnitude of this operation. The precision and regularity of the landings and take-offs and the immense quantities of freight that are handled are almost unbelievable. Surely no other picture shows better the utter destruction and desolation of this once beautiful city.

S. L. HENN, *Secretary*

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Any plating engineer knows exactly what he wants in temperatures for the various jobs going through his plant. Few realize that the very controls he needs are waiting for him and can be installed quickly at comparatively little cost.

Starting with the wash tanks he can get a suitable control in the Sarco 87 Thermoton for the cost of a good steam trap.

For greater refinements in control the Sarco TR-22 illustrated and the Sarco TR-21 control are available. For chrome he can add automatic cooling at little cost.

For most plating jobs he can keep temperatures within a degree or two with the inexpensive Sarco LSI Electric Controls.

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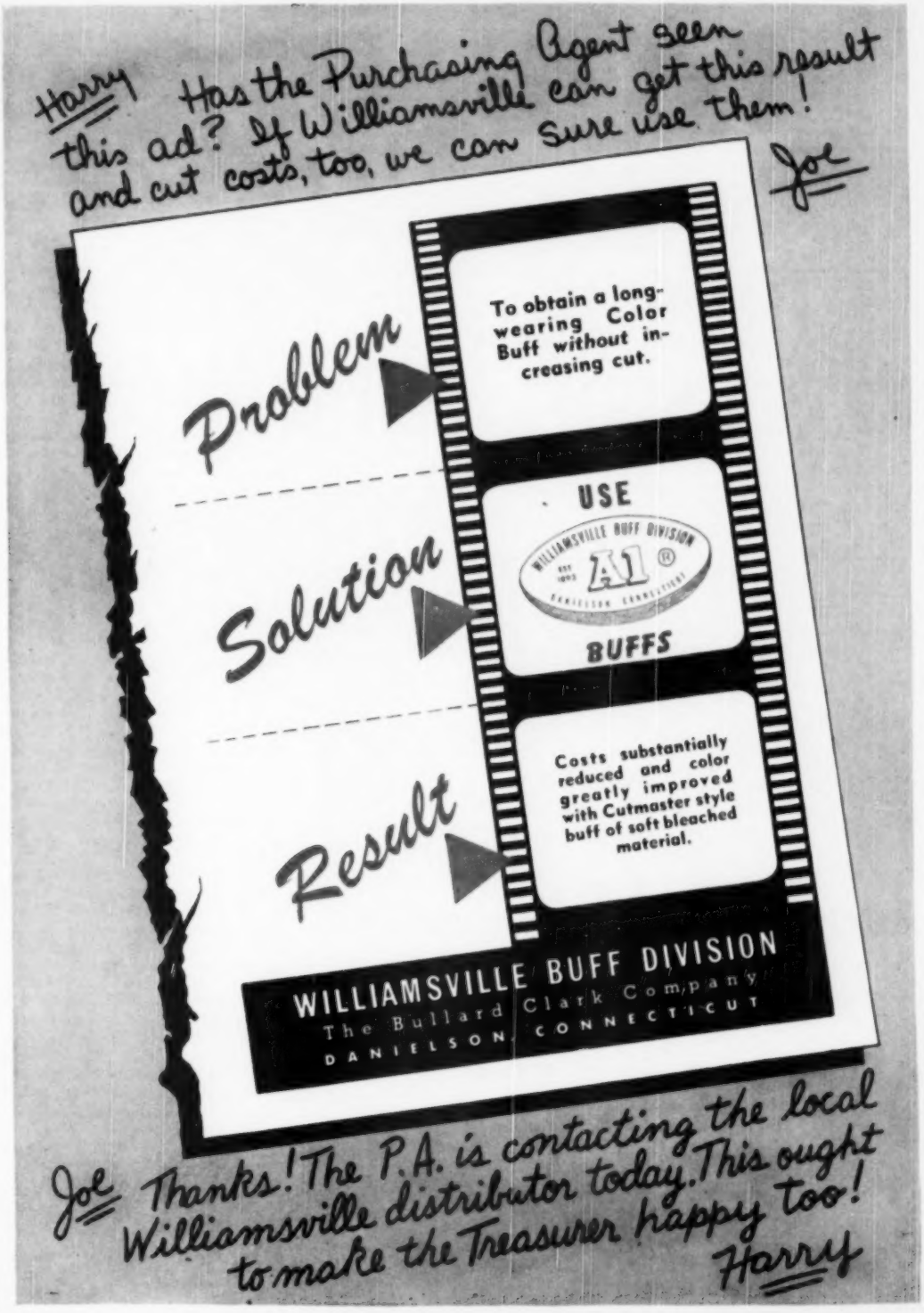
Harry Has the Purchasing Agent seen this ad? If Williamsville can get this result and cut costs, too, we can sure use them!
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To obtain a long-wearing Color Buff without increasing cut.
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USE
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Result
Costs substantially reduced and color greatly improved with Cutmaster style buff of soft bleached material.
WILLIAMSVILLE BUFF DIVISION
The Bullard Clark Company
DANIELSON CONNECTICUT
Joe Thanks! The P.A. is contacting the local Williamsville distributor today. This ought to make the Treasurer happy too!
Harry

thiocyanate; some died after two days in a 0.002-*N* solution; all died within 2 hours in a 0.04-*N* solution. Ellis[127] quoted Demyanenko as reporting that 200 ppm ammonium thiocyanate is toxic to fish. Oeming[207,515] said that thiocyanates are 1/600 as toxic as cyanides. Ridenour and co-workers[499,500,501] found that 1000 ppm polysulfide or thiocyanate did not adversely affect sludge digestion processes in sewage treatment.

Heating to Dryness at Elevated Temperatures

There is considerable uncertainty concerning the stability of cyanides under conditions of elevated temperatures in the presence of air with and without the presence of water vapor and other substances. Under certain conditions chemical reaction may take place, though under slightly different conditions the cyanide may be quite stable, and these conditions for stability and instability are probably not the same for different cyanides.

TABLE IV. DECOMPOSITION PRODUCTS OF CYANIDE SOLUTIONS HEATED TO DRYNESS

Decomposition Products	Analysis, per cent	
	Experiment 30	Experiment 21
NaCN, unconverted	0.5	0.0
Sodium carbonate, Na_2CO_3	52.6	92.4
Sodium formate, NaCOOH	30.0	0.0
Sodium hydroxide, NaOH	0.0	0.0
Hydrogen cyanide, HCN	2.3	2.5
Ammonia, NH_3, and carbon dioxid., CO_2	7.1	4.1
Total	92.5	99.0

Unpublished work[b] performed on a laboratory scale in 1945 showed that evaporation of various cyanide solutions to dryness with subsequent heating to 240° C (464° F) destroyed the cyanide and rendered the original metallic ions insoluble. Thirty-three experiments were performed with various types of solutions under several conditions. In some experiments solutions were added dropwise to kettles maintained at 560° C (1040° F); in others the total solution was fed and evaporated, and the residue heated to 240° C (atmospheric pressure). Details of two of the experiments are as follows:

Experiment 30. Ten grams of sodium cyanide and three grams of sodium sulfate were dissolved in 100 ml water. The solution was placed in a steel pot and evaporated, and the residue heated to 240° C. The sides of the pot were washed down with a minimum of water, the solution evaporated, and the residue reheated to 240° C.

Experiment 21. Ten grams of sodium cyanide and five grams of sodium sulfate were dissolved in 100 ml water and the same procedure followed as in experiment 30 except that a temperature of 560° C was used instead of 240° C.

The results of these two tests are given in Table IV. It was calculated that at a cost of 0.1 cent per cubic foot of gas used as a source of heat at 25 per cent efficiency, a 5 per cent (as NaCN) cyanide solution would cost 19.4 cents per pound of sodium cyanide to destroy. To use bleaching powder would cost 18 to 25 cents per pound of sodium cyanide. These costs were only for the materials used and did not include equipment or labor costs. On this basis the use of heat would be feasible for solutions containing over 5 per cent sodium cyanide. It is worth noting that the cost of this method is primarily affected by the amount of water to be evaporated whereas the cost of a chemical treatment is primarily affected by the amount of cyanide or other reacting chemicals present. The heating method has the advantage that there is no troublesome sludge, the residue remaining from the treatment being a more or less insoluble solid of small bulk. The method, as noted before, was tried only on a laboratory scale and there would probably be considerable difficulty in adapting it to a large-scale process. Since the bulk of cyanide plating wastes may be expected to contain less than 5 per cent cyanide, the figures already given show that the heating process would not be economically practicable except under circumstances where the bulk of the evaporation could be carried out with heat otherwise wasted in the plant or where the cyanides could be concentrated by some such process as ion exchange.

(To be continued)

Cut Costs
Get Bright Deposits
Speed Operation

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DU PONT "ZIN-O-LYTE" zinc plating salts

- easily operated—yielding brilliant zinc deposits direct from the bath *without bright dipping!*
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- suitable for all types of zinc plating, particularly barrel plating.
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Floyd F. Oplinger

Floyd F. Oplinger, Manager of Electroplating Service and Development in the du Pont Company's Electrochemicals Department, Wilmington, Del., and nationally known in the electroplating field, died on May 9 in the Chester County Hospital, West Chester, Pa. He had been ill about three weeks.

Mr. Oplinger was born in Danielsville, Pa., in 1898. He attended Albright College for two years, and was graduated from Franklin and Marshall College in 1919 with a bachelor of science degree in chemistry. Three years afterwards he received a Master of Science degree in chemistry from the University of Rochester. Later he was a chemistry instructor at the University of Rochester and the University of Maine.

In 1927, Mr. Oplinger went to work for the Roessler & Hasslacher Chemical Company as a chemist. Du Pont acquired Roessler & Hasslacher in 1930, and the following year Mr. Oplinger was transferred to the New York office as a service representative on sodium and cyanide products.

Since 1933 Mr. Oplinger has held a variety of positions in the fields of metal treatment and electroplating, both at the du Pont Laboratory in Niagara Falls and in Wilmington. In December, 1945, he was appointed Manager of Electroplating Service and Development. A number of patents have been granted on Mr. Oplinger's inventions in the field of electrodeposition of metals, and he was the author of numerous articles on this subject.

Mr. Oplinger is survived by his wife, the former Mary C. Attridge, of Rochester, N. Y., three sons, and two daughters. They are joined in their sorrow by the American Electroplaters' Society which will long remember his many years of faithful and able service to the industry and his many contributions to the Society's welfare.

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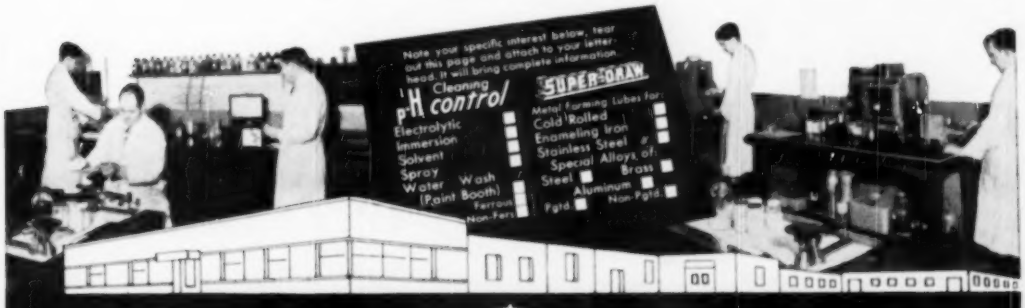

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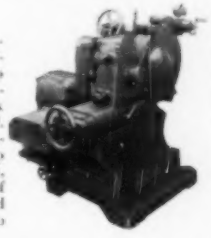

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A. S. T. M. FIFTY-SECOND ANNUAL MEETING in Chalfonte-Haddon Hall, Atlantic City, N. J., on June 27 to July 1.

DETROIT BRANCH, A. E. S. Second Annual Stag Day at Forest Lake Country Club near Pontiac, Mich., on July 30.

FOURTH NATIONAL INSTRUMENT EXHIBIT in St. Louis, Mo., Municipal Auditorium, on September 12 to 16.

AMERICAN CHEMICAL SOCIETY 116th National Meeting in Atlantic City on September 18 to 23.

AMERICAN SOCIETY FOR METALS, Cleveland, Ohio, on October 15 to 21.

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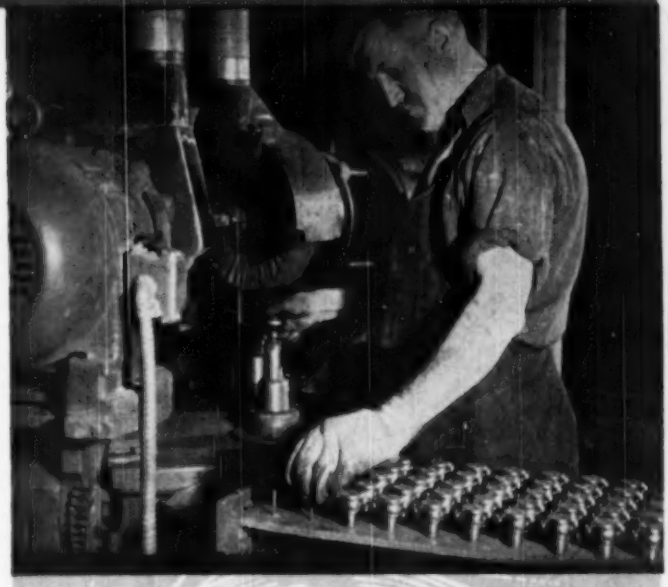

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